SEDIMENTS ANALYSIS

J.F. New & Associates

May 25, 1990

KOONTZ LAKE ENVIRONMENTAL ENHANCEMENT COMMITTEE, INC.

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TABLE OF CONTENTS

Introduction

During the fall of 1989 the Koontz Lake Environmental Enhancement Committee, Inc. conducted an inventory of the goals and accomplishments for Koontz Lake.

Koontz Lake was granted the first "Lake Enhancement Study" under the "T by 2000" program of the Indiana Department of Natural Resources, Division of Soils. This study was conducted and completed by Earth Source, Inc. in 1988 and formed the background for major construction projects. The Lawrence-Pontius Ditch had been the major source of sediments and nutrients in Koontz Lake for many years. The IDNR, working with funds secured with help from State Representative Richard Mangus, constructed nine drop structures in the ditch. These appear to be working well to stabilize the ditch bottom and to a lesser extent, to trap sediments.

Design work for the proposed sediment trap and nutrient filter has been completed, bids for construction have been awarded and the land for these projects has been acquired. Construction is scheduled for the summer of 1990.

The Koontz Lake Environmental Enhancement Committee's responsibility for a public access site has been completed. A channel was constructed in January 1990 as per permits and design. The completion of the public access site will be done by the Indiana Department of Natural Resources, Division of Fish and Wildlife, during the summer of 1990. Land for this project has also been secured.

In summary, control of incoming nutrients and sediments should be achieved by August 1990. The public access site should also be completed by that time.

With these accomplishments, the Committee felt it was ready to undertake a program to further improve Koontz Lake by removing in-lake sediments. A study was proposed which set forth a series of three tasks which would provide the KLEEC with information to 1) evaluate the location, depth and type of sediment present in Koontz Lake, 2) locate suitable disposal sites for these sediments and estimate the costs of the land and the necessary levees and 3) evaluate the feasibility of sediment removal using

both hydraulic (suction) dredging and conventional mechanical methods. The complete proposal is included in Appendix 1.

TASK I **Determine the amount, type and location of sediments in Koontz Lake from the shoreline to the 10 foot depth.**

The first order was to develop the transects necessary to locate the exact sampling areas. To accomplish this, 44 points were selected approximately 500 feet apart along the entire shoreline. Where possible, these points were located near physical features that could be located on an aerial photograph. Compass readings were then made to determine the exact transect line. Sightings were also made on a stationary structure at the far shore location. These sightings were very helpful to the crew which later took the samples. Samples were taken at 100 foot intervals along these transects out to the 10 foot depth. Sampling points are shown in Illustration 1. Depths below 10 feet were considered to be of greatly reduced vulnerability to weed growth and sediment resuspension by powerboat activity. At each sample site the following information was recorded:

1. Depth to the top of sediment (considered the lake bottom with fathometric readings).

2. Depth to the original bottom, determined by examination of the sample cores.

3. Thickness of the sediment as it actually lies in the lake.

4. Thickness of sediment after compression by removal from sampling device.

5. A description of the sediments.

6. Additional comments.

A few samples were taken for nutrient analysis. All core samples were taken from November 25 to December 20, 1990 and most were taken through 2" to 6" of early ice. Table 1 presents the results for each sampling point.

An estimate of the sediment volume was made using the core sample data. To accomplish this task a contour map was drawn showing one foot intervals of the uncompressed thickness of the sediments (Illustration 2). From this map the acreage of each one-foot interval of sediment thickness was measured with a planimeter. The acreage was then multiplied by the average sediment thickness for each one-foot contour interval. This produced the volume of uncompressed sediment in acre-feet (1 acre-foot equals 43,560 cubic feet or 1,613.3 cubic yards) for the east, central and west basins as shown in Table 2 (a) and the proposed east and west channel renovations in Table 2 (b).

As shown in Table 1, Koontz Lake Sediment Data, there is great disparity between the thickness of the sediment as it has settled in the lake and the dewatered, or compressed thickness. Although compressed thickness increases with overall sediment depths, the thickness increases at a much reduced rate as shown in Illustration 3. Due to the varying compressability of the sediments in each basin, depending on the source material (muck, silt, sand, clay), the compressed thickness was averaged separately for the east, central and west basins. For each one-foot contour interval of the uncompressed sediment (e.g. 0'-1', 1'-2', etc.) the average thickness of all samples in that range was calculated for each basin. It was considered necessary to know the volume of the dewatered sediment in order to effectively communicate with contractors who would be interested in bidding on the sediment removal project.

Once sediment data was mapped and discussions were initiated with the Koontz Lake Environmental Enhancement Committee, Inc., questions began to emerge which were beyond the original scope of this study. From examining the actual cores it became very clear that much of the sediment deposition in the central and western basins did not come from the Lawrence-Pontius ditch. Dr. Thomas L. Crisman, in the "T by 2000" study of Koontz Lake, suggested that "shoaling" was occurring in these two basins due to wave action caused by motor boats. Our study showed that motor boats do in fact cause large amounts of in-lake sediment movement. The propeller-wave effect is greatest where the depth is less than 6 feet. In heavily used areas of the lake, especially in the strait between the east and central basins (Transects 15, 16 and 17 for instance) the top of the sediment is most often about 5 or 6 feet, no matter how deep it may run. Along the western side of

the central basin sand from near shore has been moved out to deeper water and is often found over mucks and peats.

In view of the movement of sediment deposits it was decided that the 7 foot depth contour and those areas where the top of the sediment was within 7 feet of the surface should be mapped separately. See Illustration 4. Since sediments deeper than 7 feet are less likely to be resuspended, these areas were determined to be below the zone of cost-effective removal. Once the 7' contour was determined calculations were made to determine the amounts of sediment from this depth to the shoreline in each basin.

The volume of sediment to be removed was calculated from the shoreline to the point where the top of the sediment is seven feet below the lake surface, and from that point straight down to the original lakebed. This method of measurement gives sediment removal contractors a definite starting point (from the lakeshore to the top of the sediment at the seven foot depth) and a definite ending point (the original lakebed under the seven-foot contour line).

Because of the volume of boat traffic in the relatively narrow channels between the three basins, additional areas of seven foot depths were designated through the channels between the East and Central basins and the Central and West basins and are shown in Illustration 6. If these areas are dredged, a very high percentage of the sediment and nutrients vulnerable to boat disturbance would be removed from these heavily used areas.

This zone, 0' to 7' deep, then becomes the area where dredging will be most cost-effective. At an estimated removal cost of $4.00 per cubic yard, removing all the sediment from the shoreline to the seven foot depth would cost $781,036, excluding the cost of the disposal sites and levee construction.

This information was made available to the KLEEC as soon as it was calculated. The Committee wished to continue to allow motorboating and water skiing in all three basins of Koontz Lake. Discussions at that time resulted in a map (Illustration 7) of the recommended power boat activity zone that would allow reasonable use of the lake for high speed power boat activity, reduce resuspension of bottom materials and prevent the actual

erosion of bottom parent material. **The formulation of a plan to limit power boat activity to this recommended area is by far the most cost effective step in improving lake water quality.**

TASK II **Provide information for sediment disposal**

Locating the sediments and understanding them was the first task. Finding suitable disposal sites for the sediments was the goal of Task II.

Using information gathered for Task I, and presented in Table 2, it was determined that removing the 194,259 cubic yards of sediment in the three basins and channel areas to the 7-foot (top of sediment) level would require a total of 120 acre-feet of storage, or an area 40 acres in size with a disposal depth of 3 feet over the entire area.

Keeping in mind the possibility of hydraulic (suction) dredging of the sediments, all disposal locations selected were within 1.2 miles of the lake and no more than 15 feet above the lake elevation. The efficiency of hydraulic dredging decreases with distance and elevation.

Many sites meeting the distance and elevation criteria were eliminated from consideration for other reasons. Wooded areas were disqualified because of difficulties in getting sediments to disperse evenly and the subsequent loss of the trees. Known wetland areas could not be used because of the damage to wetlands caused by filling and the difficulty in obtaining permits from the Army Corps of Engineers. Residential areas were not considered because building levees around small areas with little storage capacity is not cost efficient. Areas with considerable slope were ruled out because of the difficulty in building and maintaining the levees. Much farm ground was given low priority due to cost of acquisition and the decreased permeability due to soil type and possible compaction.

Each remaining site was subsequently inspected with a local real estate broker. Using the realtor's experience, an estimate of land values was obtained for each site. Additional comments and opinions of the realtor were also recorded.

The suitable areas are shown on a plat map, a USGS topographic map and a National Wetlands Inventory map in Illustrations 9, 10 and 11. Estimated costs per acre and additional comments are shown in Table 3.

Because sediment removal may be done with a hydraulic dredge and disposal pipe and since the procedure would take several months, it is necessary to provide retention areas in locations that eliminate the need to cross the lake with disposal piping. Crossing the lake with the disposal pipe would restrict boat traffic to either side of the pipeline. Routing the pipe around the shoreline results in longer distances to the disposal sites and less efficiency in the process. The most practical sediment detention sites were selected for disposal from each basin and are shown in Illustration 12.

The cost of levee construction has not been calculated at this point. This procedure is not a large expense, nor does it require a great deal of time. It does, however, require a minimum estimate of volumes for each site. J.F. New and Associates will furnish such data to the Koontz Lake Environmental Enhancement Committee at no cost when the disposal sites are selected and actual site preparation becomes necessary. If estimates of the sediment disposal cost are needed, this simple formula can be used: An area of 1,000' x 350' is approximately 8 acres. If the area is level, it will store 24 acre-feet, or 38,700 cubic yards. On average, a 4' high levee would be required. The levee should have at least a 2' crown with 2:1 side slopes. Therefore, it would require 40 cubic feet or 1.5 cubic yards of earth to build 1 foot of levee. Our sample area requires 2,700 feet of levee x 1.5 cubic yards per running foot = 4,050 cubic yards. At an estimated cost of $1.25 per cubic yard, the levee cost would be $5,062.

The cost of minimum rehabilitation of such an 8 acre site would run $4,400, using the calculations of leveling with a heavy disk at $500.00 per acre and seeding the area to a common pasture mixture at $50.00 per acre. The sediment contains adequate nutrients to support a vigorous stand of vegetation. It should also be pointed out that even though the land for disposal may need to be purchased initially, some resale value should be anticipated. In the case of some sites with poor soils, the resale value may be more than the original purchase price.

According to the Crisman study of Koontz Lake, there are no problem levels of contaminants in the lake sediments.

Using the above assumptions and calculations and a land cost of $800 per acre, the disposal site cost would be calculated as follows, assuming 40 acres 3 feet deep:

Land cost at $800 per acre	$ 32,000
Levees for 8-acre cells	25,310
Rehabilitation with 8-acre cells	22,000
TOTAL LAND COST	$ 79,310

Three hydraulic dredging contractors currently working in the Midwest were located. Those contractors are:

Austin Stroman
Michigan Aquatic Control, Inc.
1415 Cedar Drive
Imlay City, Michigan 48444
(313) 724-8978

Gordon Easlick
E & E Construction
4856 Skyline Drive
Perrinton, Michigan 48871
(517) 682-4268

Jeffrey Krevda
Dredging Technologies
4896 East 200 South
Marion, Indiana 46953
(317) 674-9418

The dredging contract should be based on sediment volume at the disposal site. The dredged volume would be 25% to 50% less than the compressed sediment estimate, and would be less than 10% of the sediments as measured in the lake.

PART III **Provide information for project if performed by conventional earth-moving equipment such as tracked or wheeled implements.**

This portion of the study was originally to have compared the cost of sediment removal by hydraulic dredging and sediment removal after a lake drawdown. Once the sediment cores were taken and information was compiled from Part 1 of the study, it was determined that portions of Part III would need to be modified, deleted and/or new examinations made.

The firm of PTGR Engineers - Land Surveyors was subcontracted for the engineering studies of the physical aspects of a lake drawdown procedure. Instructions were given that this was to be simply a quick, inexpensive evaluation and was not to delve deeply into each obscure detail. In order to reduce the near limitless questions possible, several assumptions were made based on the following factors:

Koontz Lake drainage area = 6.25 square miles
Koontz Lake normal surface area = 346 acres
Normal surface elevation is 715 feet
The lake should be lowered 12 feet, to elevation 703'

Assumptions:

1. That pipe(s) may be placed over the sheet pile dam, through the culvert under the road, through the openings in the energy dissipator, and continue at least to elevation 700'.

2. That the pipe and all connections will be air tight, that the control valve (if installed) will be airtight; and that an automatic vacuum priming system will be in operation. The vacuum pump connections should be at the highest point of the pipe (above the sheet pile).

3. That connecting channels have been dredged deep enough and wide enough to allow the lake to drain to elevation 703 feet as quickly as the siphon can remove water from the sump.

4. That the pipe inlet "sump" is large enough and deep enough to prevent air gulping and vortices, until the lake level is drawn down to the desired elevation of 703 feet.

5. That the pipe length needed is about 400 feet, sufficient to go from the "sump" to the outlet pool at elevation 700'.

6. That four to six elbows will be needed to pass over the sheet piling and to zig-zag through the energy dissipator.

7. That the Department of Highways will allow these temporary obstructions in the drainage structure.

8. That no freezing cold weather is encountered.

9. That for priming purposes the pipe outlet is always fully submerged and that the outlet pool volume is sufficient to fill about 300' of the largest pipe needed. (In addition to allowing an automatic priming process, this might also remove the need for control valves.)

10. That the section of pipe reaching into the lake is sufficiently weighted to avoid floating or movement due to waves or sudden influx of water to the sump area.

11. That a sustained flow of 30 cubic feet per second (7.5 gal/cubic foot x 30 cfs = 225 gal/second x 60 = 13,680 gal/min x 60 = 820,800 gal/hour) will be tolerated in the downstream channel.

12. That Koontz Lake average inflow is about 1.0 cubic foot per second per square mile of drainage area (about 12 acre-feet per day for the 6.25 square mile drainage area), typical of many watersheds in northern Indiana.

13. That the USGS map adequately defines the depth contours for the lake.

14. That little water drains from the marsh on the north of Koontz Lake. (Calculated times to draw down Koontz Lake will be somewhat increased by water which flows from the marsh to the lake during the draw down process.)

Findings:

1. With one 24" diameter pipe the initial draining of the lake would take abut two months, exclusive of any storm events. With one 18" diameter pipe the time to drain the lake would take about four months exclusive of storm events.

2. A storm event which produces 1" of runoff over the watershed will put abut 330 acre feet of water in the lake. If this occurs when the lake is already drawn down, then about two weeks will be required with one 24" pipe to remove this water.

3. With one 12" pipe operating under three feet of head, about 2.7 cubic feet per second (5.4 acre-feet per day) would be conveyed. Such a pipe could be used to maintain the lowered lake level during times of low flows (between storm events).

Operating Scheme:

1. **Initial drawdown.** With both ends of the large pipe submerged, activate the vacuum pump to remove air from the line. Flow will start automatically and will continue until the siphon is broken by air accumulation. Periodic removal of accumulated air will keep the siphon going until the desired drawdown is achieved.

2. **Reaction to storm event.** Repeat item #1 above.

3. **Maintaining low lake level.** Same as #1 above, but with the small pipe (if a small pipe is installed). The small pipe is not necessary but would reduce the frequency of the starting and stopping of the siphon which would occur with a large pipe. Alternatively provide a control valve on the downstream end of the large pipe and provide a larger sump area at the upstream end.

The cost estimate by PTGR is shown in Table 4.

A major change in the assumptions used by PTGR is that it may not be necessary to lower the lake 12 feet. If sediment removal is most cost-effective to the 7 foot depth, the lake would have to

be lowered only about 9 feet. This in turn would greatly affect many of the PTGR calculations and possibly some of the time and permitting problems. What it did not affect were the responses from contractors asked for price quotes. Although they admitted it would make the project simpler, none would offer a bid. Each contractor wanted to see the drawdown before submitting a firm bid. A list of contractors who might be interested in the work is included in the appendix.

Permits Required

One of the most critical tasks of any project dealing with public lands and waters or environmental impacts is knowing what permits are necessary to accomplish an activity. It is known that disposal of fill material into wetlands is not permitted by the U.S. Army Corps of Engineers, therefore wetland areas were not considered for disposal sites. In an effort to cover all bases, letters were sent to all agencies which might have any authority on a sediment removal project. All correspondence is included in its entirety in the Appendix. These responses are for the exclusive use of the Koontz Lake Enhancement Committee for this project only. In no instance should this correspondence be used as recommendations or advice for any other projects.

Here is a brief summary of the permit requirements from various county, state and federal agencies:

1. The U.S. Army Corps of Engineers does not require a permit if the sediment is not deposited in wetlands.

2. The U.S. Environmental Protection Agency does not require a permit if the sediment is uncontaminated and not deposited in wetlands.

3. The Indiana Department of Environmental Management does not require a permit if the dredged material is not deposited in wetlands. A National Pollutant Discharge Elimination System (NPDES) permit is not required for the decant water.

4. The Indiana Department of Natural Resources, Division of Water, requires a permit for alteration of the shoreline or bed of a public freshwater lake.

5. The IDNR Division of Fish and Wildlife and Division of Nature Preserves have no permitting authority, but are allowed to comment on applications filed with the Division of Water.

6. The Kankakee River Basin Commission has no permitting authority.

7. The Marshall County drainage board does not require a permit for sediment removal.

Information received after the completion of this report will be forwarded to the Koontz Lake Environmental Enhancement Committee.

The cost of preparing permit applications will vary considerably, depending upon the amount of sediment to be removed, the method used and the disposal sites selected. Additionally, the project must be presented to the Indiana Department of Natural Resources which will evaluate the positive and negative effects of the plan. The approval of the IDNR must be obtained prior to any permit applications.

Obtaining cost estimates for sediment removal by dredging after a lake drawdown and by hydraulic dredging was one of the initial goals of this study. This point became immaterial when no bid estimates for conventional sediment removal could be obtained from contractors. This major problem and the subsequent awareness of environmental concerns, the cost of dewatering the lake, the loss of water-related activities for several months and the smaller area known to need desilting leads our firm to recommend a suction dredging technique for silt removal. We feel there are too many unknowns with too much risk to undertake even a limited drawdown for sediment removal.

The decision to remove lake sediments is complicated. Once the need is recognized, the first step is to control sediment sources such as drainage ditches and sheet erosion from unprotected fields. Another means of controlling sedimentation is to establish a zone around the shoreline in which high-speed boat traffic is prohibited. The Koontz Lake Environmental Enhancement Committee has already addressed the sediment inflow from the Lawrence-Pontius Ditch. The Committee will need to address what limits, if any, will be placed on motor boat activity, and which areas of Koontz Lake are most in need of desilting.

One of the important differences between this study and other lake studies was the effort made in having goals in mind for each portion of the study. An example was the question of looking at sediment-borne nutrients to compare with the density of aquatic weed growth.

To accomplish this, four samples were collected from the lake bottom for analysis. The chosen locations were sample site 3D in the west basin, 14B in the southeast part of the central basin, 20D in the east basin and 39G in the northwest part of the central basin. These locations were selected to show correlations with known weed growth densities. Unfortunately, the 20D sample did not contain enough solids to be properly analyzed.

Since the goal was to correlate the soil analysis with plant growth in the lake, an agricultural laboratory was used. The results therefore relate to how a plant should respond to the level of nutrients. The completed analysis is shown in Illustration 14.

In his report on Koontz Lake, Dr. Tom Crisman noted that there has never been a lack of phosphorous available for plant growth. The samples tested for this study show that all phosphorous levels were considered Very Low. We believe these results show that very low levels of phosphorous are more than adequate for aquatic plant growth.

There is no lack of any nutrient critical for aquatic weed growth in Koontz Lake. In effect, water depth limits plant growth much more than the nutrient levels of the lake.

J.F. New & Associates was asked to make recommendations on several questions which were natural evolutions of this study. These recommendations are a result of that request. It should be pointed out that the lake ecology will continue to change as a result of improving water quality in the Lawrence-Pontius Ditch.

1. Water quality testing

No one can say exactly what will happen to the nutrient loading levels in the lake in the next few years. We know that the amount of incoming nutrients will be significantly reduced, but do not yet know the baseline nutrient level. Dr. Tom Crisman of the University of Florida is very interested in the results of the chemical testing for nutrients. He has volunteered to analyze results and make his studies available to the Koontz Lake Environmental Enhancement Committee as trends evolve. Dr. Crisman and J.F. New & Associates recommend the following tests be performed monthly and after major storm events and during the spring runoff period:

Parameters:
- Total phosphorus
- Ortho phosphorus
- Ammonia
- Nitrite
- Nitrate
- Kjeldahl nitrogen
- Alkalinity
- Total suspended solids

We would further recommend that the analysis be done by Dr. Joe Camp at the Purdue University North Central campus in Westville, Indiana. The Commmittee should contact Dr. Camp to make arrangements for these tests. There should be at least four test sites, preferably at these locations:

A. Immediately above the proposed sediment trap in the Lawrence-Pontius Ditch.

B. Immediately below the proposed nutrient filter marsh.

C. At the outfall of the 16" tile below County Road 5-B.

D. At the outlet of Koontz Lake.

Testing should continue for a minimum of three years before a meaningful evaluation of the results can be made.

Secchi disk studies should be conducted as were originally planned for 1989, with results sent to Dr. William Jones at Indiana University in Bloomington.

2. Aquatic weed control

As with nutrient loading in the lake, no one can say exactly how the aquatic weed situation will change. We do know that increased water clarity will allow greater sunlight penetration and increased weed growth. The large population of carp which feed on the lake bottom contributes to the resuspension of sediment. We are also now aware of the tremendous resuspension of sediments and nutrients by power boats. All of these factors will influence weed growth.

With the sediment traps and nutrient filters in place on the Lawrence-Pontius Ditch and boating restrictions in effect in shallow areas, the threat of massive algae blooms is reduced. Ideally the weeds could be chemically controlled to a very high degree. Practically, however, we would recommend the following procedure until a knowledge base is established on the above mentioned variables.

A. Present weed control activities in front of residential properties should be continued, but massive mid-lake weed kills should be avoided for at least 2 years.

B. A weed control committee should be formed to identify aquatic weed problem areas, locate them on a map, make note of the dates and durations of occurrences and compile the data. Basic weed identification can be made by your chemical applicators or by Mr. Bob Robertson, fisheries biologist with the Indiana Department of Natural Resources. A person or team could easily learn the species of weeds found in Koontz Lake and thoroughly monitor the aquatic weed situation.

C. After two years the Committee will have the knowledge base for accurate decisions.

The need for some powerboat use limitations in shallow areas was discussed in several meetings with the Koontz Lake Environmental Enhancement Committee. It is recommended that the enclosed map, Illustration 7, should be used as a guide for setting up speed restriction areas. We are recommending the use of buoys to mark the area of powerboat activity. The standard buoys used by the Indiana Department of Natural Resources are made by Rolyan. We recommend models B576S or B576S-C, both 5" diameter spar buoys 76" high.

We have not yet had a response from the Indiana Department of Natural Resources regarding the legality of "voluntary" restrictions of motorboat activity. The Koontz Lake Environmental Enhancement Committee should speak to the Director of the IDNR and set forth the reasons for this request. We are very confident that it is permissible and highly recommend the initiation of the project. Buoys placed at intervals of 700 to 800 feet will more than adequately mark the restricted area. We feel the use of voluntary restraints is the initial key to the success of this program.

3. Fishery renovation

The District Fisheries Biologist for the Indiana Department of Natural Resources was asked about the effect of a drawdown on the fishery resource. His response addressed the direct expense of rotenone treatment of the lake and watershed and the cost of restocking the lake, as well as the value of lost recreation opportunities. The species, estimated number and cost of fish for an adequate restocking are listed in Table 5.

To: Jim New
J.F. New & Associates
P.O. Box 243
Walkerton, IN 46574

From: Bob Robertson
District Fisheries Biologist
Bass Lake State Fish Hatchery
R.R. #3, Box 240
Knox, IN 46534

Date: 1/18/90

Dear Jim,

This letter is a response to your question concerning the impact a possible 12' drawdown would have on the Koontz Lake fishery. Although I see no way that the state would allow such a severe drawdown to occur at this time, I have attempted to estimate the results.

A 12' foot reduction in lake level would reduce the lake's volume by over 80%. Some water would be left on both the central and eastern basin (approximately 400 acre feet). Many fish would probably have been lost from the lake during the draw down, but I'm sure the amount of fish left in these two pools would be impressive. Depending upon water temperature, all fish would quickly die from lack of oxygen. Fish salvage would be difficult, if possible at all, due to the expanse of mud flats around the pools.

Prior to refilling, the watershed as well as the two pools would have to be treated with rotenone. This would insure that all non-game fish had been eliminated from the watershed. When the lake had filled enough for fish survival (this could take quite a long time), state hatcheries would probably supply the appropriate stocking.

This project would likely result in at least two years of lost fishing. Estimating fishing pressure at Koontz Lake at only one half of the pressure at Worster Lake (similar size, creel surveyed in 1987), loss of fishing would cost the area

over $400,000. This figure is based on $11.00 per fishing trip (Glander, 1983).

Rotenone for the watershed and basin treatment would be approximately $12,000 (300 gallons @ $40.00 per gallon). Restocking similar game species (largemouth bass, bluegill, redear, channel catfish, black crappie, northern pike and walleye) would cost approximately $30,616, based on the latest state fish hatchery cost figures. If purchased from private hatcheries, this cost would be considerably higher.

Since the 1970 renovation, Koontz Lake has provided the area with a fairly high quality fishery. Over the past 19 years, thousands of people have enjoyed successful fishing trips. Since 1984 Koontz Lake has been one of several northern Indiana lakes included in our largemouth bass size limit study. As a result of the 14 inch minimum size limit that went into effect at Koontz Lake on October 1, 1984, the bass population has increased substantially. The 1989 bass population was estimated at nearly 19,000 fish compared to an average of 5,200 fish during the pre-size limit period of 1984-85.

The bass size limit and expected improvement in water quality as a result of the lake enhancement program should result in even better fishing at Koontz Lake in the near future. I certainly don't see how anyone could justify the devastation of the present fish population at this time.

Bob Robertson
Fisheries Biologist

Community Reactions to Lake Renovation Projects:

In order to get an idea of community opinions and reactions to lake dredging projects, two communities which have recently experienced lake renovation were selected for study. Business and property owners were asked how long they have been in the area, if they felt the lake drawdown has helped or hurt the community in general and their business in particular. They were also asked for their recommendations to other lake improvement groups interested in similar work, and if their area was faced with this decision again, would they support or oppose the action. The two areas used for comparison are Sylvan Lake and the nearby town of Rome City, and Palestine Lake and the town of Palestine.

The greatest long term economic effect of a lake improvement project is on the value of nearby homes and land. For this reason, information was gathered on population and income trends of the surrounding counties, the numbers and values of new single family homes and the distance to larger cities which might affect the local real estate market.

The information on population, income trends and home values was obtained from "The Indiana Fact Book, 1989" published by the Indiana University School of Business and the Indiana Business Research Center. Population estimates for cities were obtained from the 1989 Rand McNally Commercial Atlas and Marketing Guide.

SYLVAN LAKE, Rome City, Indiana

Sylvan Lake is a 575 acre lake in northeast Noble County. The town of Rome City, population 1314, lies on the west edge of the lake. Kendallville (population 7,300) is 7 miles to the southeast, Fort Wayne (175,100) is 36 miles to the southeast and Elkhart (44,900) is 43 miles to the northwest.

Sylvan Lake is in the natural lakes region of northeast Indiana. There are approximately 30 lakes within a 10 mile radius, of which Sylvan Lake is the largest.

Because Sylvan Lake and Rome City are just 3 miles from LaGrange County, demographic information was researched for LaGrange County as well as Noble County. Both counties are largely rural with 25% to 50% of the Noble County population residing in "urban" areas in 1980 and less than 25% of the LaGrange county population residing in urban areas (this report uses the 1980 census definition of "urban" areas as comprising an incorporated place and adjacent densely settled surrounding area that together have a minimum population of 50,000 and places of 2,500 or more outside urbanized areas). From 1980 to 1988 population growth far surpassed the statewide average of 1.2%. Noble County experienced an 8.9% increase and LaGrange County grew 13.1%. Population growth projections for 1980-2000 predicted an increase of 14% in Noble County and 29% in LaGrange County. Projected "net migration" figures for the same time period estimated a net gain of 700 residents for Noble County, although from 1980 to 1986 there was a net migration loss of 100 residents. LaGrange County was expected to have a net migration gain of 300 residents in the two decades from 1980 to 2000, but from 1980 to 1986 had no net migration gain or loss.

The number of households in both counties increased at a faster rate than the state average of 4.4% for the period 1980 to 1985; Noble County gained 7% and LaGrange County gained 11%.

Per capita personal income in both counties in 1986 was less than the state average. Noble County average per capita income was 87% of the state average and ranked 67th of the 92 counties. LaGrange County per capita income was 82% of the state average, ranking 80th. Per capita income increased about 40% from 1979 to 1985, keeping pace with the statewide average increase.

In 1987, "permit authorized and imputed" single family new home construction totaled 190 units in Noble County with an average value of $41,532 and 148 units in LaGrange County with an average value of $41,858, far below the state average of $78,762.

Sylvan Lake was drained in 1984 for a fishery renovation. The lake was severely overpopulated with carp and shad and suffered from very poor water quality as a result of sediment disturbance by the carp.

Several area business owners and residents were contacted and asked their opinions of the effects of this lake restoration work. Their answers are summarized below:

Business: Bait and tackle shop in Rome City
Owner: Carl Kleinrichert
Mr. Kleinrichert has been in business 13 years. He feels the lake drawdown has helped the community in general. Business was slower, but not too bad, the first two years after the lake drawdown. His business is supported by other lakes in the area. The drawdown and results have benefited his business. The result is better fishing and reduction of the carp population. His recommendation to other communities is to wait until August to drain the lake. If he had to make the decision again, he would support it 100%. Mr. Kleinrichert supported the initial decision to drain the lake.

Business: "Sails Real Estate" in Wolcottville
Owner/Broker: Mike Strawser
Mr. Strawser has been in business 10 years and in the area 28 years. He feels lake drawdown has helped the community in general and his business in particular; property values have increased an average of 10 to 12% per year for the last 3 years. His recommendation to other communities is to educate the public as to the reasons and benefits of the lake drawdown and to increase public awareness. If Mr. Strawser had to make the decision again, he would support it.

Business: Hefty's Lake Mart, Rome City
Owner: Mike Hefty
Mr. Hefty has been in area 35 years. He believes the lake drawdown has helped the community as well as his business. He said property values have "doubled and tripled" and would support the decision again. (An employee of Blaising's Tavern and Family Dining was present and agreed with Mr. Hefty's opinions.)

Business: Edwards Carpets, Rome City
Linda Edwards, daughter of the store owner, said the family has been in business 26 years. She did not have an opinion as to whether the drawdown helped or hurt the community in general, but she has heard comments on what a nice lake it is now. She said that for the past two years, "business has been great" and that

if the decision had to be made again, she would support it.

Business: Rome City Hardware
Owner: John McCoy
Mr. McCoy has been in business about 10 years. He had no opinion as to whether or not the drawdown hurt or helped the community in general, but said that property values improved "big time." He believes it did not affect his business very much. He would advise other communities that in the long run, it helps. If the decision were to be made again, it would make no difference to him either way.

Business: Super Value Grocery
The store manager has been with the business for 11 years. He feels the lake improvement has helped the whole community, and has raised property values. He saw no negative impacts, only positive results and would support the decision if it were to be made again.

Lakefront home owner
James Bird had lived on Sylvan Lake 15 years. He had no opinion as to whether or not the drawdown has helped or hurt the community, but believes the lake should be drawn down more often to allow residents to fix seawall, clean out weeds, etc. He wishes Sylvan Lake would be drawn down again. He would support the decision again.

PALESTINE LAKE, Palestine, Indiana

Palestine Lake is a 232 acre lake located in southwest Kosciusko County. The town of Palestine, population 100, lies on the west edge of the lake. Warsaw (population 11,400) is 7 miles to the northeast and Fort Wayne (175,100) is 50 miles to the east.

Palestine Lake is on the southwest edge of Indiana's "lake district". There are approximately 25 lakes within a 10 mile radius, of which Palestine Lake is the second largest after Winona Lake in the city of Warsaw.

Kosciusko County's population is mostly rural with 25% to 50% of the residents living in "urban" areas in 1980. Population growth

projections for 1980-2000 predicted an increase of 12.2% and from 1980 to 1988 the county population increased nearly 10%. Projected "net migration" figures for 1980-2000 anticipated a net loss of 200 residents, although from 1980 to 1986 there was a net migration gain of 200 residents.

The number of households in Kosciusko County increased 10.7% in the period from 1980 to 1985, while the state average was 4.4% for the same period.

Per capita income in Kosciusko County in 1986 was 4% above the statewide average, ranking this county 18th in the state. Per capita income increased about 44% from 1979 to 1985, slightly faster than the statewide average increase of 40%.

In 1987, "permit authorized and imputed" single family residential construction totaled 320 units with an average value of $65,922, below the state average of $78,762.

Palestine Lake was drained in 1988 for repairs to the dam and renovation of the fishery. Ed Braun, IDNR fisheries biologist, reported that after the lake was drained and the fish were killed with Rotenone, only three bass were found in the entire lake. The infestation of carp had reduced the water clarity to a Secchi disk reading of one foot. Two years later, the Secchi disk readings are about 17 feet.

The only business in the village is a campground.

Business: Naomi's Lake Breeze Campground
The owner is a lifetime resident of Palestine Lake and has been in business 9 years. She said the drawdown helped because the lake had too many carp and the fishing was not good. She is looking forward to fishing this spring. The drawdown might have hurt her business for a year, but believes it will help in the long term. She believes the projected benefited the community and would support the decision again.

Lakefront residents
Gladys Reese and Thomas Harmon are both lifetime residents of the area and believe the drawdown helped the lake and community.

Lakefront resident
Name: George Woryna
Mr. Woryna has lived near Palestine Lake 35 years. He said there were benefits and drawbacks to the project. There are fewer carp in the lake and the fishing is better, but there are too many weeds and it is difficult to get a boat on the lake. The drawdown interrupted fishing, but if fish stock comes back the fishing improve. Overall, the project has been a benefit to the community. Several new houses have been built and there are more people living at the lake all year long. If he had it to do over again, he would probably support the decision. Because of the cleanup he was able to fix his seawall, but because of the weeds he can't fish as much as he wants to, especially from a boat.

Lake front resident
Name: Allen Walker
Mr. Walker has lived near Palestine Lake 30 years. He believes the drawdown has neither hurt or helped the community, but the results are good and he would support the decision again.

Lakefront resident
Name: Betty Rice
Ms. Rice has been in the area about 8 years. She believes the drawdown most definitely helped the community in almost every way. It helped to raise property values, improved fishing and attracted more people to the area. She said the water was drained in September and was back by Thanksgiving. She would advise other communities to plan ahead to do repairs on the seawalls, clean up trash, build beaches and piers because it all happens too quickly. She would certainly support the decision again.

Area resident: Richard Walker
Mr. Walker has been in the area 17 years. He is not sure yet if the project has hurt or helped the lake and community. He advises other lake associations to make sure drawdown or dredging is done more efficiently than in their lake. Mr. Walker would have preferred dredging. He also mentioned the importance of applying for permits several months before the drawdown starts. At Palestine Lake, many applications to clean up personal property and the shorelines were not approved until <u>after</u> the water had been returned, so the permits were of no use.

Area resident: Edith Carper
Ms. Carper has lived in area 5 years. She is not yet sure if the drawdown has hurt or helped community in general. Some property owners threatened to sell at the time, but few did. She said the lake is now clear, the carp have been killed off and the lake has been restocked with game fish. The game fish are now visible through the clear water, but the dense growth of weeds hinders fishing. The abundance of weeds makes it difficult to get a boat on the lake and too unpleasant to swim. Her advice to other communities is to sit tight, you cannot fight it, it will happen one way or the other. The smell can be unpleasant. As for supporting the decision again, Ms. Carper is doubtful. Taxes have gone up and she is unable to fish from a boat due to the weeds.

Area residents: Ancil and Mary Fisher
The Fishers have lived at Palestine Lake area 8 years. Right now they are undecided as to the effects upon the community. They said the drawdown has helped the fishing and nothing else because of the weeds. They would recommend asking a lot of questions beforehand and finding out what to expect during and after the drawdown and deciding who will take care of these problems. If making the decision again, they would object because of the weed problem.

Area resident: Kenneth Rice
Mr. Rice has lived at the lake 5 years. He feels the drawdown has helped the lake. The rough fish are gone, the lake has been restocked and it is now a more popular fishing area. He said that a few homeowners sold before the work was done, but now property values are up and homes are being bought as soon as they are put on the market. His advice to other communities is to clean up personal lake fronts which the machinery cannot reach. He would support the decision again.

Area Resident: Tracy Rice
Ms. Rice has lived in the area 5 years. She is still undecided about the effect on the lake and community. There are more fish, but more weeds too. She is not sure whether or not she would favor this decision again.

Andric Lake is connected by a channel to Palestine Lake and also was drawn down.

Area resident: Robert Brooner
Mr. Brooner has lived in the area 50 years. He believes the project has definitely helped the lake because it was "dead" and had to be cleaned up. The lake is now recovering nicely. He had no problems with the drawdown, but would suggest that property owners organize and make sure the trash gets cleaned up while the water level is down and to plan ahead because there is not much time to work. He would support the decision again.

Area residents: Dennis and Theresa Miller
Mr. Miller was very concerned and involved, tried to watch carefully during the entire drawdown. He is concerned about where scavenger fish went downstream.

KOONTZ LAKE, Koontz Lake, Indiana

Koontz Lake contains 346 acres in Starke and Marshall counties and is less than two miles from St. Joseph County. The town of Koontz Lake has a population of 1,436 and is 4 miles south of Walkerton (population 2,051) 10 miles west of Plymouth (7,693) and 30 miles south of South Bend (107,900).

Because Koontz Lake is located in two counties and very near a third, economic information was obtained on all three counties. Most of the lake lies in Starke County which has less than 25% of its population in "urban" areas. Marshall County's population is 25-50% urban and St. Joseph County is more than 75% urban.

Population growth projections for 1980-2000 anticipated a loss of 3% in Starke County, an increase of 12% in Marshall County and an increase of less than 1% in St. Joseph County. The actual population change for the period 1980 to 1988 was a gain of less than one percent in Starke County, a 6.8% increase in Marshall County and a 1% increase in St. Joseph County.

The number of households in Starke County increased 2% from 1980 to 1985, Marshall County households gained 8% from 1980 to 1985,

while St. Joseph County saw a 4% increase.

Per capita income varies widely in the three counties surrounding Koontz Lake. In 1986 the per capita income of St. Joseph County was about 6% above the state average, 9th highest in the state, and increasing faster than the state average from 1979 to 1985. Marshall County per capita income was 92% of the state average, ranking 44th, and kept pace with the percentage increase statewide. Starke County trailed with 73% of the state average income (89th of the 92 counties) which increased 31% from 1979 to 1985 while the state average increase for the same period was 40%.

There was also a large disparity in the value of single family new home construction. Figures for 1987 show St. Joseph County leading in both number and average value of new homes with 981 constructed at an average value of $91,000. There were 144 units constructed in Marshall County with an average value of $57,000. Starke County had only 47 units constructed, but the average value was $64,000, somewhat surprising in view of the minimal population growth, much lower than average per capita income and the slower rate of income growth. A real estate broker in Knox indicated that Bass Lake attracts buyers from South Bend, Valparaiso, Merrillville and Chicago, and that in the past few years existing homes on Bass Lake have been demolished to make way for new homes.

Business owners and residents of Koontz Lake were asked their opinions about a lake improvement project involving possible suction dredging of sediment or lowering the water level and excavating the sediment off the lake bed.

Business: Johnson Insurance - Don Johnson
Johnson Insurance was founded in 1955, and Mr. Johnson has been an owner of lakefront property since 1972. He believes the drawdown would help the community in general but would probably not have much effect on his business, although in the long run it would affect the number of customers. He believes a temporary drawdown would not be a hindrance and would support the decision if it would solve the lake's problems.

Business: Allen's Furniture - Doris Allen
The Allens have owned the business 10 years. Mrs. Allen believes

a lake drawdown would hurt the community and her business at the time, but would eventually help. Although she would not like the drawdown at the time, she would like the overall lake improvement and would support the decision.

Business: Koontz Lake Supermarket - Larry Miller, owner
Mr. Miller has owned the store 10 months. He feels a drawdown of the lake would hurt community and his business financially because it would affect the number of people who come to the lake from out of town. He believes the lake should not be drawn down without more information. He is interested in the lake and its problems, but believes it is very hard to make decisions without knowing what problems may be involved and what would happen if they were not corrected.

Business: Al's Diner - Allen McEndarfer, owner
Mr. McEndarfer has been in business in Koontz Lake almost three years. He likes the idea of dredging, and feels the lake improvement would definitely help the community. He thinks it will possibly increase taxes, but understands this is progress and will probably help business and the growth of the community. If the lake had to be closed, it would be hard on his business, but he would support whatever it takes to improve the lake. Mr. McEndarfer also feels very strongly about creating a new septic system around the lake, and would like to have the drainage ditch used by the farmers, etc. to be rerouted around the lake.

Buiness: Koontz Lake Library - Bonnie Davis, manager
Ms. Davis has lived in this area 6 years, has worked in the library periodically for 3 years, and now manages the library. She believes a drawdown would help the general community in the long run, but would probably not affect the library. She does not feel it would be good for the lake area during the drawdown, but feels she would have to support whatever was decided.

Business: American State Bank - Bea Rosenberry, branch manager
Ms. Rosenberry has managed the branch since 1975, and has lived in the area 30 years. She is definitely against the draining of the lake and believes the community would be hurt if the lake was drained, but dredging would have less severe effect. She would like to have more information before supporting decision to draw down the lake and would like to know what would happen to the lake if nothing was done. She is also very concerned about the

effect on the water table and residence wells.

Business: Wilson's Auto Sale - Fred Wilson, owner
Mr. Wilson has been in the area 7 years. He believes if it would help solve the lake problems, the drawdown will help the community, but if the lake deteriorates it will hurt everyone in the area. He personally feels drawing the lake down would be a mistake, not for business reasons but for the fishery. He believes that if done properly dredging is best on several points, one being that it would not affect the entire lake at one time. If for financial or other reasons the work could not be finished at one time while dredging, the work could be stopped and continued later. If the lake is drawn down, the work must be finished at that time. Mr. Wilson supports the lake improvement project, but is not so sure about a drawdown. He is very concerned about the septic systems leaching into the lake, especially on the island. He firmly believes something needs to be done; the lake will not clean itself.

Business: Koontz Lake Clinic - Dr. Bennett
Dr. Bennett did not want to hear the questions, but gave his opinion of the project. He is not interested in the lake being drained, lowered or cleaned and believes the sides would fall in if the lake was de-watered. The money already collected and spent to keep inflowing water clean will eventually result in a cleaner lake. He does not approve of spending money on a public access site and then telling people they cannot use the lake and believes that de-watering or lowering the lake would cause a severe mosquito problem. Dr. Bennett lives at the "illegal channel" and says the lake drawdown and dredging would destroy that part of the lake. He is totally against further work.

Business: Al's Bait Shop - Jeanette Rivosecchi
Ms. Rivosecchi has been in the Koontz Lake area 8 years. She thinks drawing down the lake would severely damage her business and is against this procedure, but feels dredging the sediment would help. If the lake was drawn down it might put her out of business and she wouldn't be around to see future results.

Business: Jim's Barber Shop - Jim Millice, owner
Mr. Millice has been in area 38 years. He suggested having the dredging or drawdown in the off-season to reduce the impact on the community. He would not like having the lake dewatered, but

would support the drawdown and lake improvement. The method chosen will not affect his business.

Lakefront resident: Mr. W. Zeller
Mr. Zeller has lived in the area 44 years. He believes it would hurt the community if the lake was lowered too much, but dredging would help. A fisherman, Mr. Zeller is very happy with the fishing in Koontz Lake and does not want to see this disturbed. He is definitely against de-watering and does not feel it would be possible.

Business: Howard's Standard Station - Jerome Howard, owner
Mr. Howard has been in business since 1978. He thinks a lake drawdown would not harm the community, but will probably hurt business temporarily if people cannot use the lake while the work is being done, although he does not feel this would affect or hurt his business at all. He would support drawdown as long as the condition of the lake is improved and believes something must be done.

Business: Lakeside Realty - Regg Williams, owner/broker
Mr. Williams has been in business 14 years and feels a drawdown of Koontz Lake would hurt the community and his business in particular, especially economically. If the lake could not be used it would hurt many businesses in the area. He would not support de-watering the lake, and from the information he has at this point, would definitely object to a decision to draw down the lake.

Business: G's Dockside Restaurant - Mary Ann Giese
The Gieses have been area resident 20 years and have owned a lakefront business 4 years. She feels that lowering or de-watering the lake would hurt the community somewhat, and would decrease their business from boaters, but this is a small portion of her customers. She believes that whatever method is used to clean up the lake will be more than worthwhile in the long run and will support the most effective method to do the job right and completely. She is curious about the price difference of dredging versus a lake drawdown.

Business: Stanley's Marina - David Stanley, owner
Stanley's Marina has been owned by the family since 1940. He supports the idea of cleaning up Koontz Lake and believes it will

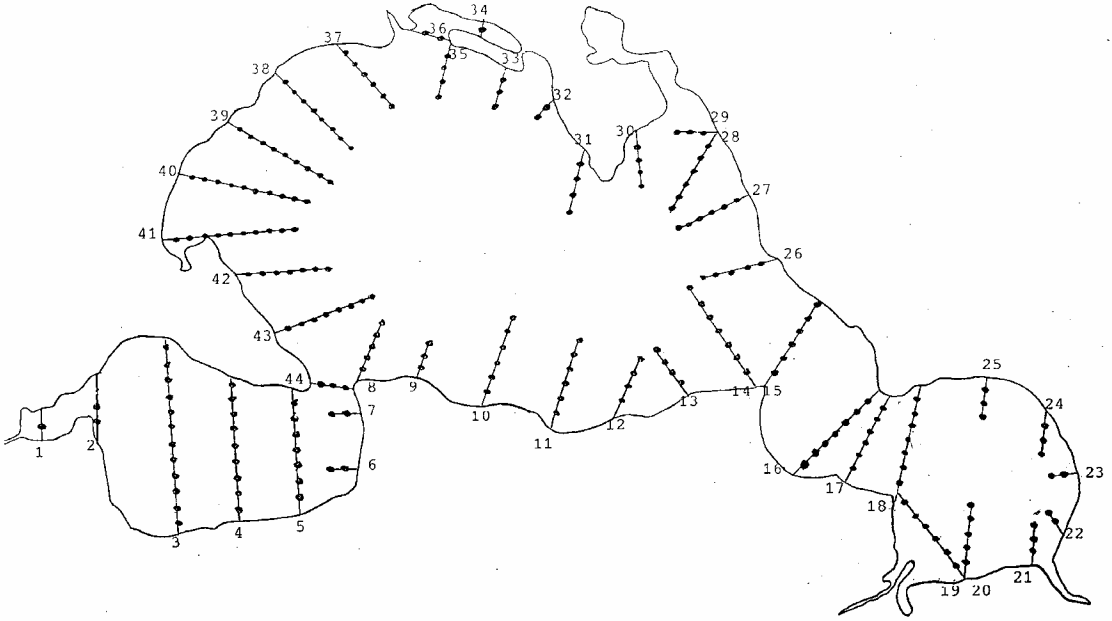
attract people to the lake. He would not favor de-watering because his business is directly dependent on the lake. Mr. Stanley would like more detailed information before favoring one method over another and wonders how long the process will take, if the lake will be useable during the cleanup and if the work can be done in the off season.

Lakefront Resident: Ernie Brovold
Mr. Brovold has been a Koontz Lake resident since 1948, forty-two years. He feels a drawdown of the lake will most certainly help the lake and will help the community in all ways. He believes that if the work is done properly and at the right time it will not cause problems. Mr. Brovold agrees with de-watering of lake, and believes that there may be problems with whichever way is used to clean up the lake, but cleanup is a must.

Lakefront resident: Robert Bauss
Mr. Bauss has been a resident of Koontz Lake since 1956. He supports a lake drawdown and believes that although this would hurt the area temporarily, especially for recreational use of the lake, it would definitely help the community later.

Lakefront resident: Mariam Chapman
Mrs. Chapman has lived in the community 44 years. She is in favor of drawing down the lake for cleanup work. In the long run, it would help the community, would help the businesses economically and would help the lakefront property values. She favors dewatering the lake for a summer; it would give the lakefront residents time and access to do much needed work on the beaches, seawalls and piers while the water was down.

ILLUSTRATIONS



Scale 1/4" = 200 ft

Illustration 1
Koontz Lake sediment sampling points

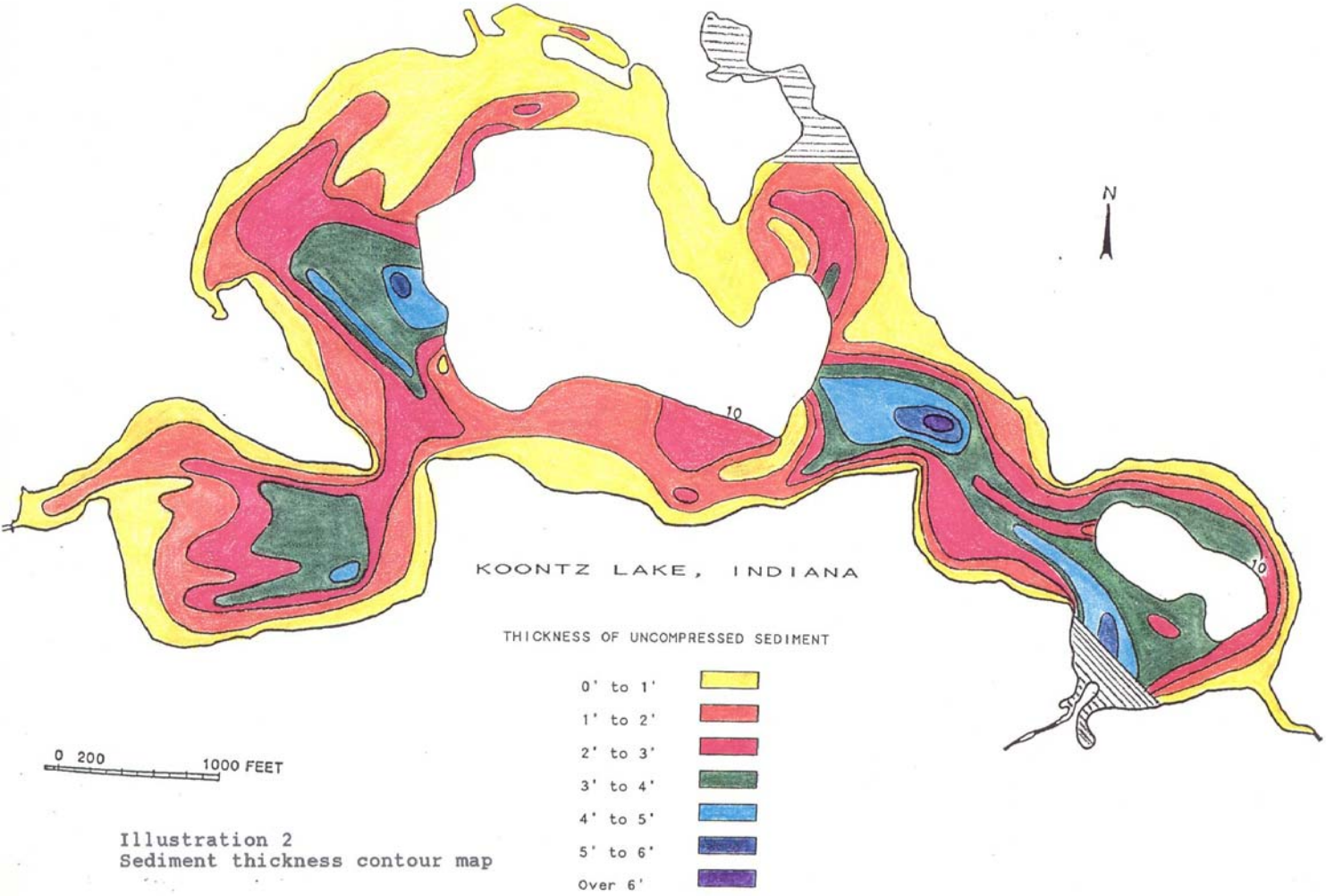


Illustration 2
Sediment thickness contour map

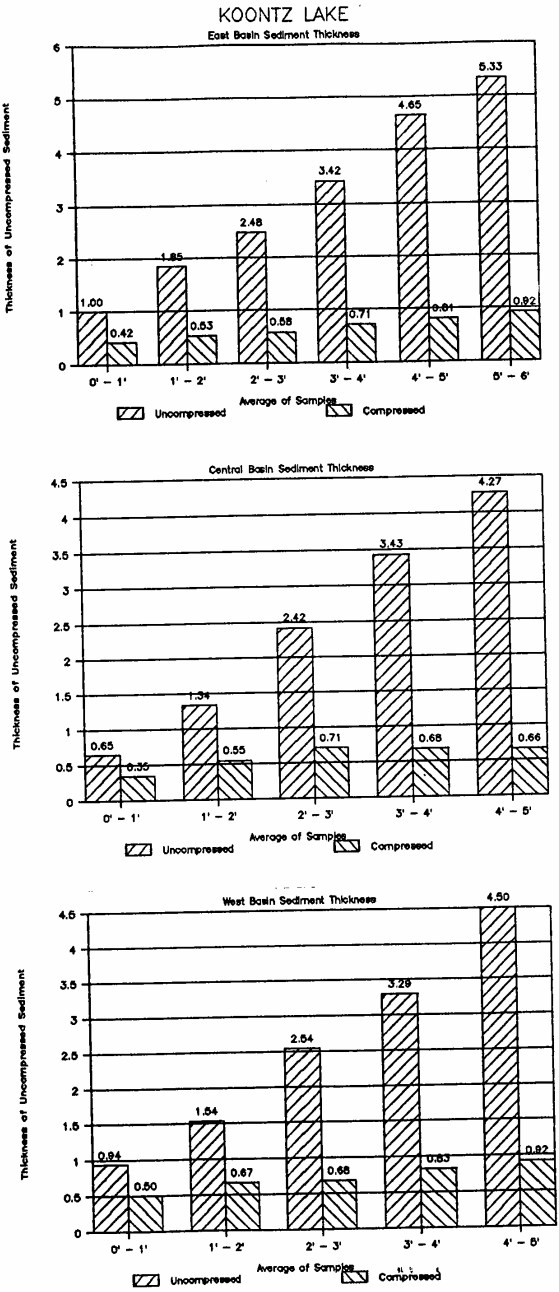


Illustration 3
Uncompressed vs compressed sediment thickness

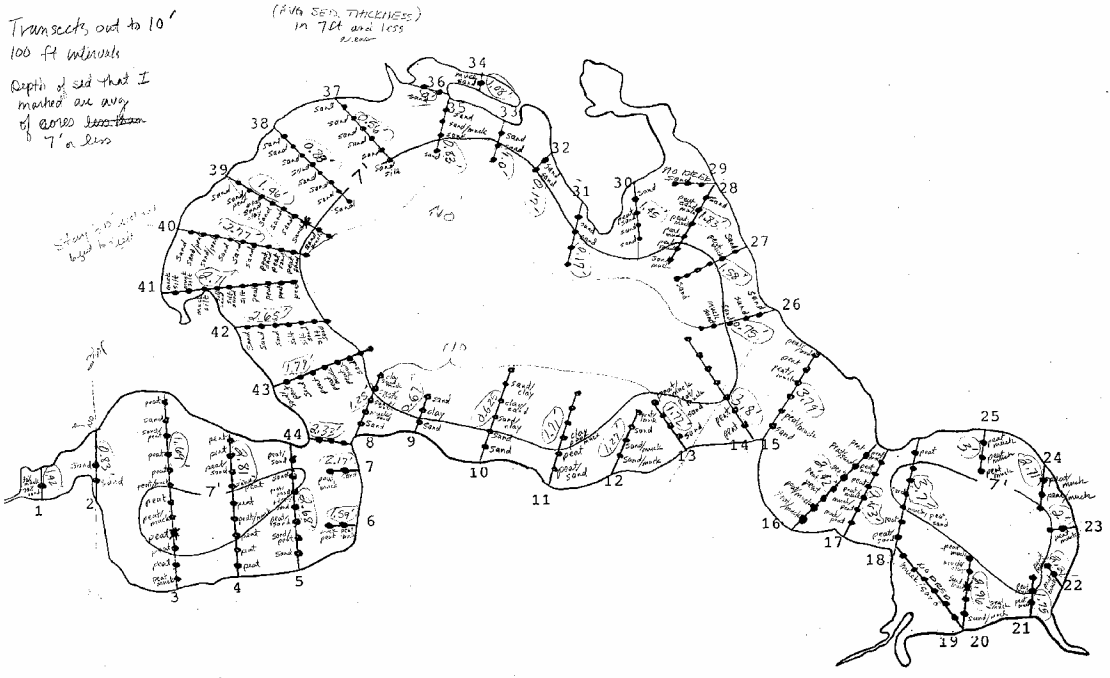
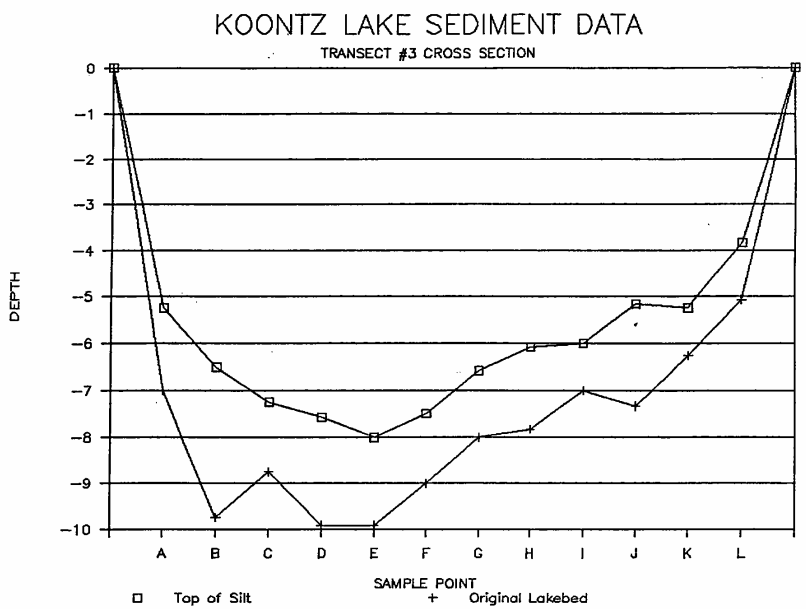


Illustration 4
Koontz Lake map showing 7 foot depth contour



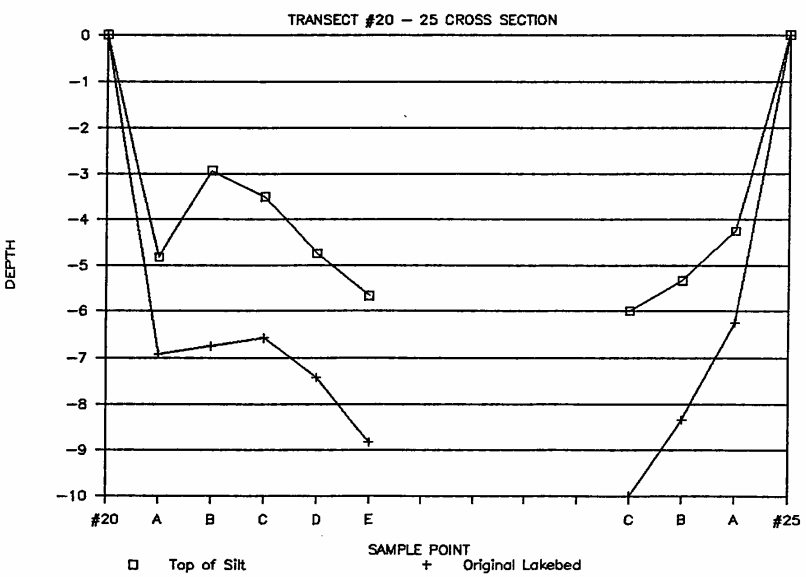


Illustration 5
Cross section of selected transects

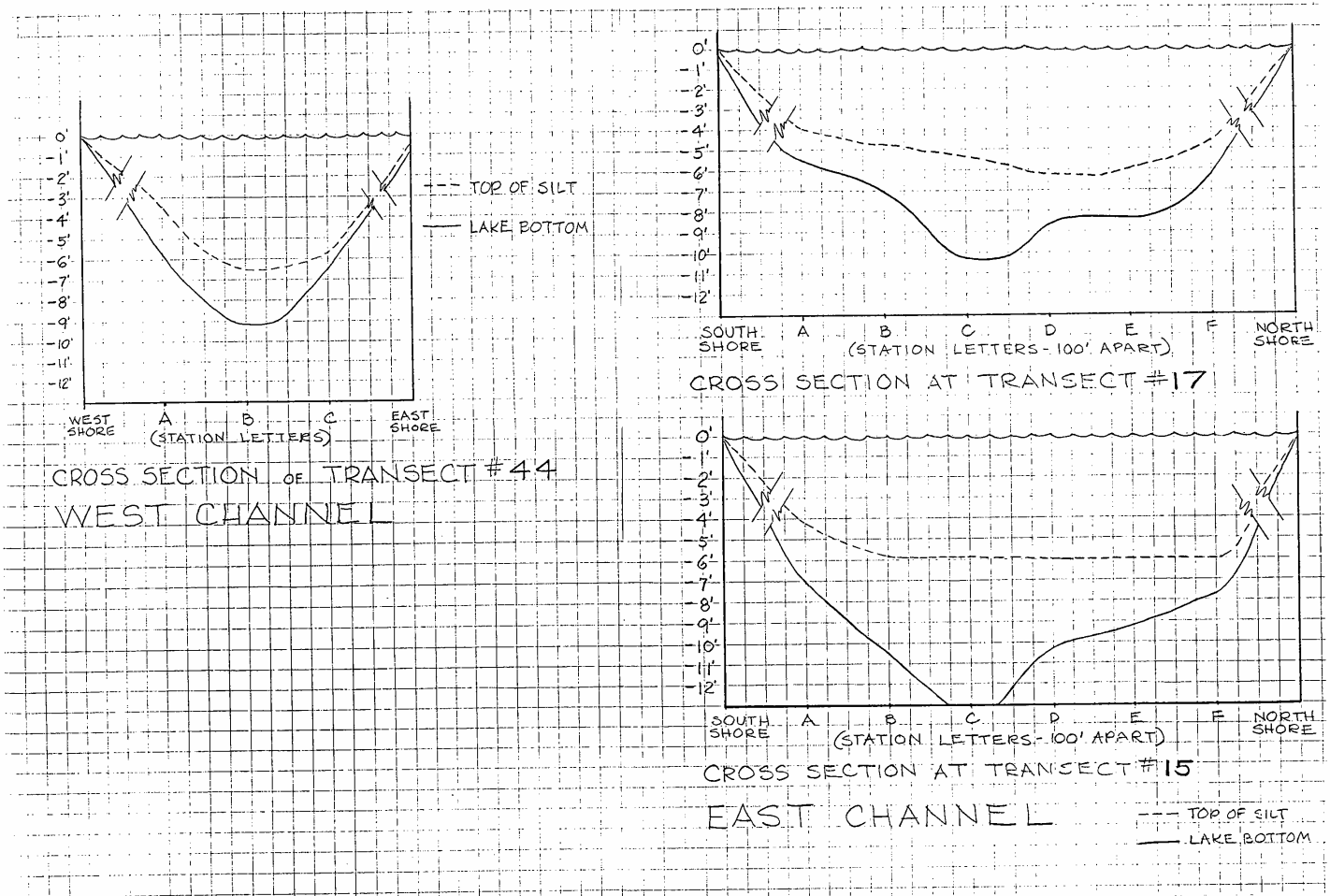


Illustration 6

Dredging areas for proposed channels

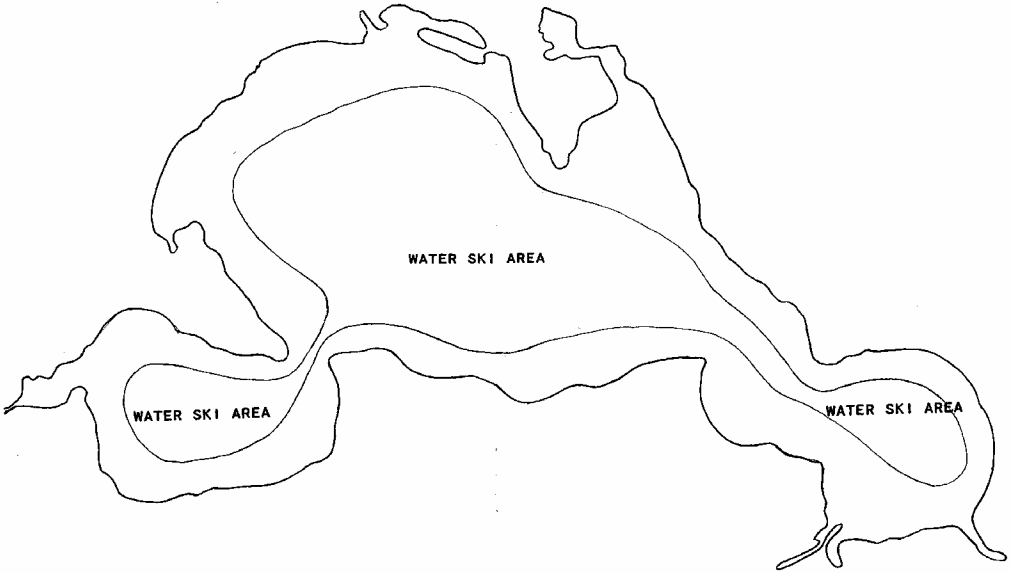


Illustration 7
Power boat activity zone, as per committee

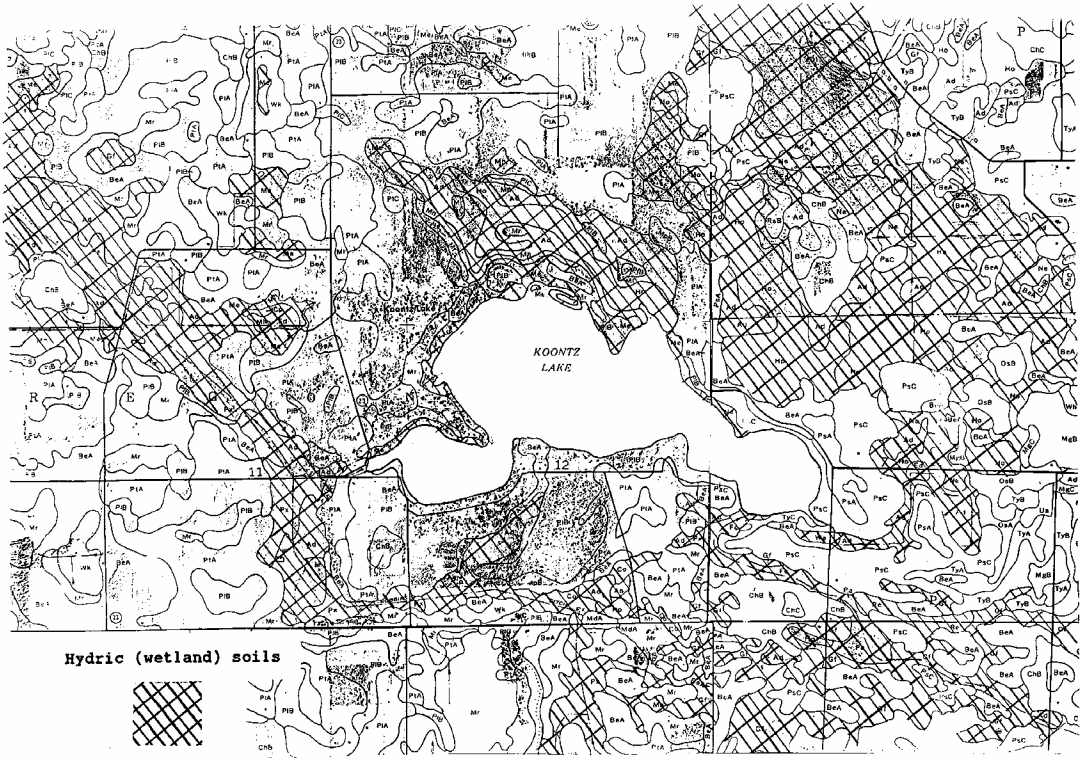


Illustration 8
Map of hydric (wetland) soils around Koontz Lake

KEY TO ILLUSTRATION 8

MAP SYMBOL	SOIL NAME	HYDRIC SOIL
Ad	Adrian muck, drained	Yes
An	Algansee fine sandy loam	Yes
BeA	Brems sand, 0-3% slopes	No
ChB	Chelsea fine sand, 2-5% slopes	No
Co	Craigmile fine sandy loam	Yes
Cp	Craigmile Variant fine sandy loam	Yes
Ed	Edwards muck, drained	Yes
Gf	Gilford sandy loam	Yes
Ho	Houghton muck, drained	Yes
Me	Maumee sand	Yes
Mh	Maumee mucky sand	Yes
MgB,MpB	Metea loamy fine sand, 2-6% slopes	No
Mr	Morocco loamy sand	No
Ne,Nf	Newton loamy sand	Yes
OsB	Oshtemo loamy sand, 2-6% slopes	No
Pa	Palms muck, drained	Yes
PlB	Plainfield sand, 1-8% slopes	No
PsA	Plainfield sand, 0-2% slopes	No
PsC	Plainfield sand, 3-10% slopes	No
PtA	Plainfield sand, wet substratum	No
Px	Prochaska loamy sand, occasionally flooded	Yes
Re	Rensselaer loam	Yes
RsB	Riddles sandy loam, 2-6% slopes	No
TyA	Tyner loamy sand, 0-2% slopes	No
TyB	Tyner loamy sand, 2-6% slopes	No
TyC	Tyner loamy sand, 6-12% slopes	No
Wk	Watseka loamy sand	No

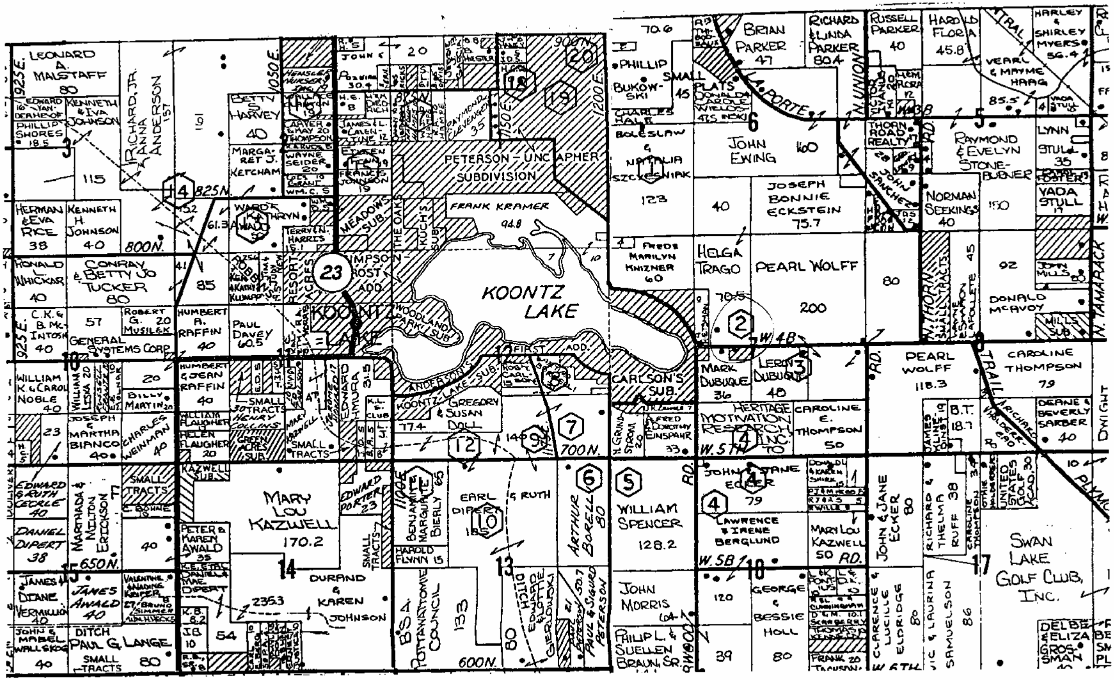


Illustration 9
Plat map of potential disposal sites

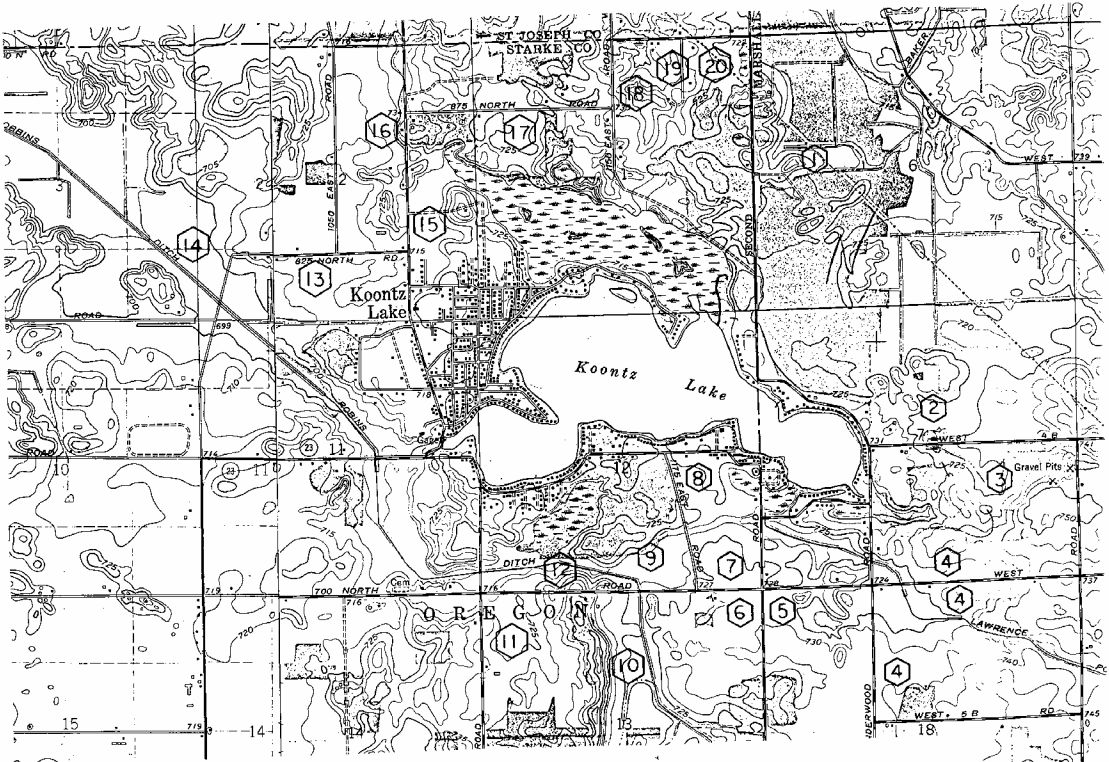


Illustration 10
USGS topographic map of potential disposal sites

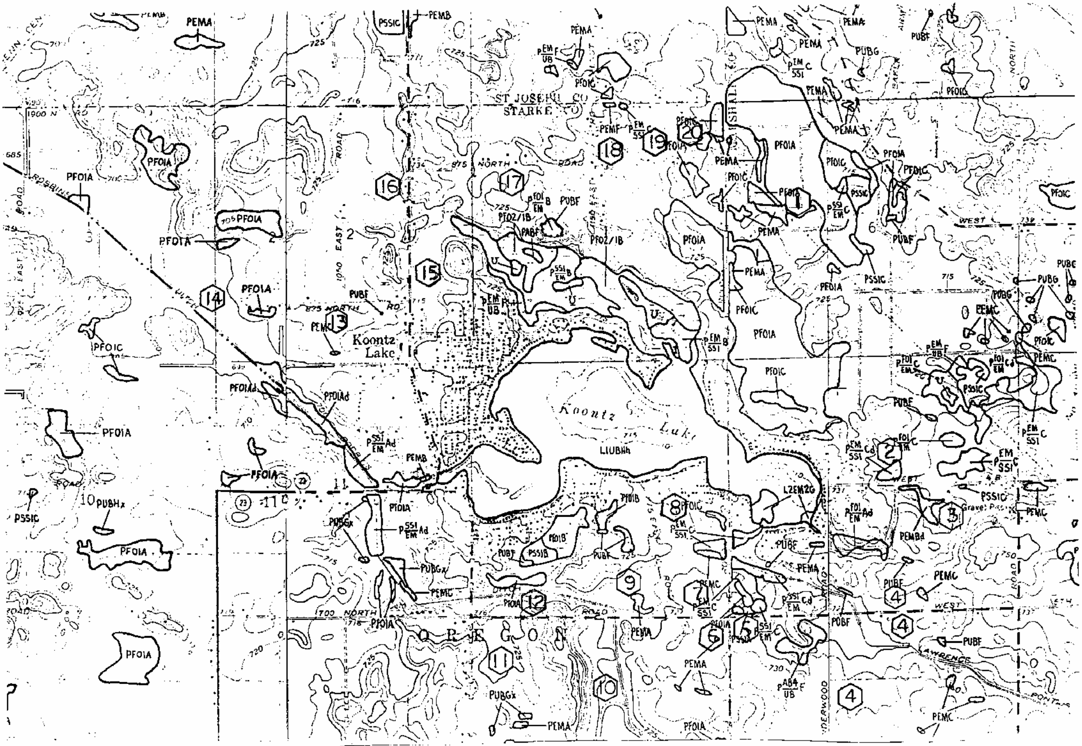


Illustration 11
National Wetland Inventory map of disposal sites

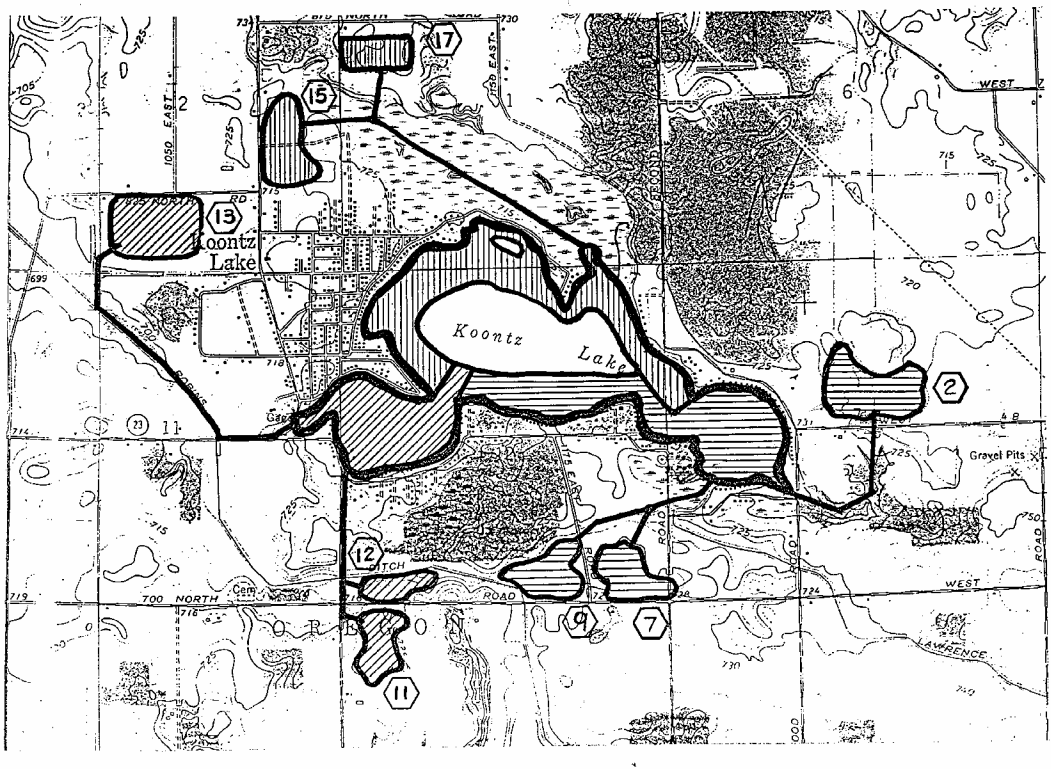


Illustration 12
Recommended sediment detention sites

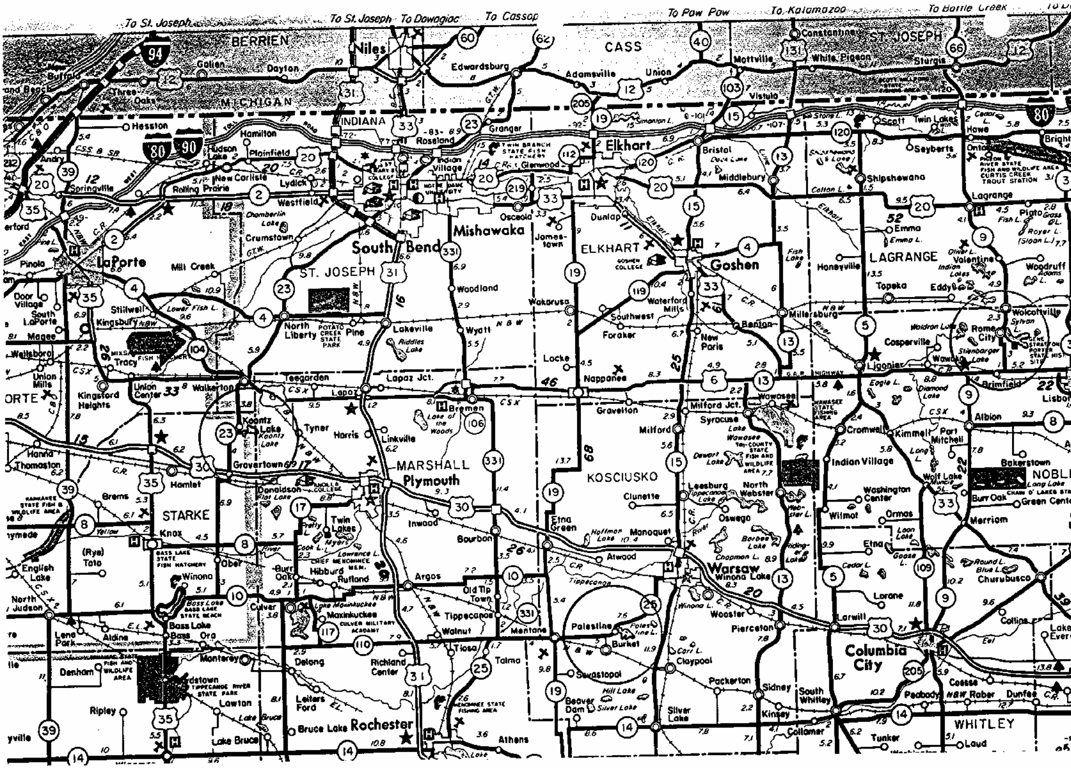


Illustration 13
Map showing Koontz, Palestine and Sylvan Lakes

REPORT NUMBER

F050-085

A & L GREAT LAKES LABORATORIES, INC.

3505 Conestoga Drive • Fort Wayne, Indiana 46808-4413 • Phone 219-483-4759

Acct # 41000

SAMPLES SUBMITTED BY:

SEND TO: Huber's Agro Service

GROWER: Lake Bottom

10202 South 100 West
Union Mills IN 46382

mg/kg

DATE OF REPORT: 02/22/90

PAGE: 1

south shore of east basin (300ft out into lake)

SAMPLE NUMBER	LAB NUMBER	ORGANIC MATTER %	ORGANIC MATTER lbs/A	PHOSPHORUS BRAY P1 ppm-P	PHOSPHORUS BRAY P2 ppm-P	POTASSIUM K ppm	MAGNESIUM Mg ppm	CALCIUM Ca ppm	SODIUM Na ppm	pH SOIL pH	pH BUFFER pH	Cation Exchange Capacity meq/100g	PERCENT BASE SATURATION % K	% Mg	% Ca	% H	% Na
20C	06404	3.8	101	3 VL		42 VL	205 L	3300 VH		6.7	6.9	19.2	0.6	8.9	85.9	4.7	
39G	06405	1.6	58	3 VL		30 VL	105 L	1950 VH		7.2		10.7	0.7	8.2	91.1		
3D	06406	3.4	93	7 VL		134 M	645 H	5900 H		7.2		35.2	1.0	15.3	83.8		

SAMPLE NUMBER	SULFER S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm	SOLUBLE SALTS mmhos/cm	NO3-N PPM			COMMENTS
20C								18 M			
39G								10 M			
3D								75 VH			

Illustration 14
Sediment sample test results

CODE TO RATING: VERY LOW (VL), LOW (L), MEDIUM (M), HIGH (H), VERY HIGH (VH) ENR = ESTIMATED NITROGEN RELEASE

TABLES

Table 1: KOONTZ LAKE SEDIMENT DATA

TRANSECT NUMBER	STATION LETTER	DEPTH TO TOP OF SILT	DEPTH TO BOTTOM	UNCOMPRESSED THICKNESS	COMPRESSED THICKNESS	SEDIMENT DESCRIPTION
1	A	8.75	10.17	1.42	1.08	30% muck, 70% clean/brown sand mix
2	A	6.00	6.83	0.83	0.25	Soft brown sand, not quite muck
	B	7.25	8.83	1.58	0.50	Brown sand with many larger roots
3	A	5.25	7.00	1.75	0.58	20% muck, 80% peat
	B	6.50	9.75	3.25	1.00	All peat
	C	7.25	8.75	1.50	0.75	All peat
	D	7.58	9.92	2.33	0.83	All peat
	E	8.00	9.92	2.92	0.67	50% muck, 50% peat
	F	7.50	9.00	1.50	0.75	All peat
	G	6.58	8.00	1.42	0.58	10% muck, 90% peat
	H	6.08	7.83	1.75	0.33	All peat, very dark compared to previous
	I	6.00	7.00	1.00	0.50	All peat, very dark again
	J	5.17	7.33	2.17	0.83	50% peat (top), 50% clean sand
	K	5.25	6.25	1.00	0.75	Sand: top 30% brown, 50% clean, 20% brown
	L	3.83	5.08	1.25	0.25	All peat, many weeds, very wet sample
4	A	5.08	7.33	2.25	0.50	All peat
	B	6.25	9.83	3.58	0.75	All peat
	C	7.00	9.75	2.75	0.83	All peat
	D	10.25	12.00 +	1.75 +		
	E	7.25	10.50	3.25	0.67	20% muck, 80% peat
	F	6.92	10.17	3.25	1.00	All peat, 50% black, 50% brown
	G	7.00	10.00	3.00	0.67	10% sand, 90% peat
	H	6.33	9.67	3.33	0.58	All peat
	I	5.58	7.00	1.42	0.75	All peat
5	A	5.00	6.17	1.17	0.58	30% liquidy clean sand, 70% brown sand
	B	6.00	10.50	4.50	0.92	40% liquid sand, 60% peat
	C	6.08	9.42	3.33	0.83	5% liquid sand, 95% peat
	D	6.25	9.58	3.33	0.75	5% sand, 95% peat
	E	6.75	9.92	3.17	1.08	3% sand, 97% peat
	F	7.00	10.08	3.08	0.67	5% liquid sand, 95% dry sand
	G	6.75	9.08	2.33	0.92	5% muck, 70% peat, 25% sand/peat mixture
6	A	5.08	6.50	1.42	0.92	5% muck, 95% peat
	B	6.25	8.00	1.75	0.67	75% muck, 25% peat
7	A	3.75	5.42	1.67	1.25	All clean sand
	B	6.00	8.67	2.67	0.83	5% muck, 95% peat, many roots
8	A	4.75	6.25	1.50	0.25	Brown sand
	B	7.08	9.25	2.17	0.33	10% sand, 90% muck
	C	6.25	7.25	1.00	0.38	90% clean sand, 10% muck
	D	8.17	9.25	1.08	0.29	85% sand, 15% muck, many roots in all layers
	E	9.00	10.25	1.25	0.33	10% muck, 10% sand w/ roots, 80% firm clay

TRANSECT NUMBER	STATION LETTER	DEPTH TO TOP OF SILT	DEPTH TO BOTTOM	UNCOMPRESSED THICKNESS	COMPRESSED THICKNESS	SEDIMENT DESCRIPTION
9	A	6.08	6.75	0.67	0.33	10% clean sand, 90% brown sand, roots in all
	B	8.83	10.25	1.42	0.42	10% brown sand, 90% firm clay
	C	10.25	11.67	1.42	0.50	10% brown sand, 90% clean sand
10	A	5.00	5.75	0.75	0.08	5% brown sand, 95% clean sand
	B	6.00	6.50	0.50	0.25	15% clean & brown sand with rocks, 85% brown sand
	C	9.25	10.33	1.08	0.58	10% muck, 60% brown sand, 30% firm clay
	D	10.00	11.58	1.58	0.50	All clay, small amount of brown sand in top layer
	E	10.50	12.00	1.50	0.58	5% clean sand over 95% clay
	F	11.25	12.00 +	0.75 +		
11	A	5.42	7.67	2.25	1.00	40% sand/peat mixture, 60% peat
	B	6.17	7.33	1.17	0.67	All peat
	C	7.67	10.25	2.42	1.08	20% muck, 35% dry peat, 45% clay
	D	9.25	12.00 +	2.58 +		
	E	10.00	12.00 +	2.00 +		
	F	12.00 +				
12	A	2.83	4.17	1.33	0.29	5% muck, 55% clean sand, 40% clean sand
	B	4.00	4.58	0.58	0.38	5% muck, 95% clean sand
	C	4.58	5.58	1.00	0.83	25% brown sand with roots, 75% clean sand
	D	4.83	7.08	2.25	0.58	10% muck, 90% peat
13	A	4.50	7.83	3.33	0.58	10% muck, 90% peat
	B	5.08	7.17	2.08	0.75	10% muck, 90% peat
	C	5.08	5.75	0.67	0.58	Brown sand
	D	5.17	6.00	0.83	0.67	10% brown sand, 90% clean sand
14	A	5.17	7.92	2.33	0.83	All peat
	B	6.17	10.50	4.33	0.83	All peat
	C	7.08	12.00 +	4.75 +		
	D	8.50	12.00 +	3.50 +		
	E	10.50	12.00 +	1.50 +		
	F	11.75	12.00 +	0.25 +		
	G	12.00 +				
15	A	4.25	7.08	2.83	1.08	25% liquid clean sand, 75% brown sand
	B	5.92	10.50	4.58	0.75	5% muck, 95% peat
	C	5.92	12.00 +	6.08 +		
	D	6.00	10.25	4.25	0.50	10% muck, 90% peat
	E	6.00	9.25	3.25	0.92	All peat
	F	6.00	7.75	1.75	0.67	10% muck, 90% peat
16	A	4.50	6.75	2.25	0.50	50% muck, 50% peat
	B	4.25	6.50	2.25	0.42	20% muck, 80% peat
	C	5.17	8.25	3.08	1.00	All peat
	D	6.25	8.50	2.25	0.92	All peat
	E	6.25	10.00	3.75	0.75	All peat
	F	5.08	6.83	1.75	0.58	30% clean sand, 70% peat
	G	5.00	6.67	1.67	0.50	All peat

TRANSECT NUMBER	STATION LETTER	DEPTH TO TOP OF SILT	DEPTH TO BOTTOM	UNCOMPRESSED THICKNESS	COMPRESSED THICKNESS	SEDIMENT DESCRIPTION
17	A	4.00	5.58	1.58	0.67	60% muck, 40% peat
	B	4.83	7.00	2.17	0.67	50% muck, 50% peat
	C	5.33	10.17	4.83	0.83	30% muck, 70% peat
	D	6.25	8.50	2.25	0.58	All peat
	E	5.08	8.08	3.00	0.58	30% muck, 70% peat
	F	4.50	6.42	1.92	0.50	20% muck, 80% wet peat
18	A	3.00	6.08	3.08	0.50	40% brown/clean sand mix, 60% peat
	B	5.08	9.83	4.75	0.75	All peat
	C	5.50	8.75	3.25	0.58	40% muck, 30% peat, 30% sand
	D	8.58	10.17	1.58	0.58	All clean sand
	E	12.00 +				
	F	12.00 +				
	G	5.50	8.83	3.33	0.67	All peat
19	A	2.67	6.83	4.17	1.08	40% muck, 60% dark colored clay
	B	1.50	6.33	4.83	0.75	10% muck, 90% clay
	C	1.08	5.75	4.67	0.83	60% muck, 40% brown sand
	D	0.67	6.00	5.33	0.92	40% muck, 60% brown sand
	E	1.83	5.67	4.83	0.58	60% muck similar to wet clay, 40% brown sand
	F	2.58	7.08	4.50	0.83	20% muck, 80% brown sand
20	A	4.83	6.92	2.08	0.50	50% clean sand, 50% muck
	B	2.92	6.75	3.83	1.00	30% muck, 70% peat
	C	3.50	6.58	3.08	1.08	40% muck, 60% brown sand
	D	4.75	7.42	2.67	0.83	60% muck, 40% dark clay
	E	5.67	8.83	3.17	0.67	10% muck, 90% peat
21	A	4.17	5.17	1.00	0.42	20% muck, 80% peat
	B	6.50	9.00	2.50	0.42	30% muck 70% peat
	C	12.00 +				
22	A	4.58	6.50	1.92	0.42	20% muck, 80% peat
	B	6.50	9.00	2.50	0.42	30% muck, 70% peat
23	A	5.00	7.08	2.08	0.50	20% muck, 80% peat
	B	10.83	12.00 +	1.83 +		
24	A	5.00	6.83	1.83	0.42	30% muck, 70% peat
	B	6.83	10.25	3.58	0.50	10% muck, 90% peat
	C	12.00 +				
25	A	4.25	6.25	2.00	0.67	50% muck, 50% peat
	B	5.33	8.33	3.00	0.67	20% muck, 80% peat
	C	6.00	10.00	4.00	0.67	20% muck, 80% peat

TRANSECT NUMBER	STATION LETTER	DEPTH TO TOP OF SILT	DEPTH TO BOTTOM	UNCOMPRESSED THICKNESS	COMPRESSED THICKNESS	SEDIMENT DESCRIPTION
26	A	3.50	4.00	0.50	0.33	Clean sand
	B	5.25	6.25	1.00	0.58	Brown/clean sand mixture
	C	7.33	7.75	0.42	0.17	Clean sand
	D	9.75	10.50	0.75	0.42	20% muck over 80% brown/clean sand
	E	11.25	12.00 +	0.75 +		
27	A	4.67	6.08	1.58	0.75	All brown sand
	B	6.75	8.33	1.58	0.83	10% muck, 30% wet peat, 60% dry peat
	C	8.17	10.33	2.17	0.67	5% muck, 95% peat
	D	9.00	12.00 +	3.00 +		
	E	9.83	12.00 +	2.83 +		
	F	9.67	10.00	0.33	0.17	Clean sand
28	A	3.67	3.75	0.08	0.04	Clean sand
	B	6.00	9.00	3.00	0.83	10% muck, 30% brown sand, 60% peat
	C	6.83	9.25	2.42	0.75	50% muck, 50% peat
	D	7.00	9.25	2.25	0.83	30% muck, 70% peat
	E	7.25	8.25	1.00	0.75	10% muck, 90% peat
	F	8.83	9.50	0.67	0.46	40% muck, 60% clean sand
29	A	3.58	4.50	0.92	0.50	10% fine muck, 20% coarser muck, 70% brown sand
	B	4.17	5.42	1.25	0.42	10% clean sand over 90% brown sand
	C	4.75	6.58	1.83	0.33	All muck, denser in lower half
30	A	3.17	4.50	1.33	0.42	All clean sand
	B	3.92	6.67	2.75	0.50	25% brown sand, 75% peat
	C	3.08	3.75	0.67	0.42	All clean sand
	D	3.50	4.58	1.08	0.83	10% brown sand, 90% clean sand
31	A	2.42	2.50	0.08	0.04	Clean sand
	B	8.58	8.75	0.17	0.08	Clean sand
	C	12.00 +				
	D	12.00 +				
32	A	3.33	3.50	0.17	0.08	Clean sand
	B	9.75	10.25	0.50	0.17	Brown sand
33	A	5.42	6.42	1.00	0.33	Brown sand
	B	10.08	11.00	0.92	0.50	Mixture of clean/brown sand
	C	12.00 +				
34	A	4.83	5.92	1.08	0.38	40% muck over 60% brown sand
35	A	1.75	1.75	0.00	0.00	Clean sand
	B	5.42	6.25	0.83	0.42	Brown sand over muck
	C	7.75	9.00	2.75	0.33	Organic sand with many roots
	D	9.25	10.25	1.00	0.33	Brown sand
36	A	1.92	1.92	0.00	0.00	Clean sand
	B	2.58	2.58	0.00	0.00	Clean sand

TRANSECT NUMBER	STATION LETTER	DEPTH TO TOP OF SILT	DEPTH TO BOTTOM	UNCOMPRESSED THICKNESS	COMPRESSED THICKNESS	SEDIMENT DESCRIPTION
37	A	1.42	1.42	0.00	0.00	Clean sand
	B	1.83	1.92	0.08	0.08	Brown sand
	C	3.17	3.50	0.33	0.33	Brown sand
	D	4.92	5.50	0.58	0.33	Brown sand
	E	5.00	6.08	1.08	0.38	Brown sand
	F	8.50	8.75	0.25	0.25	10% silt, 90% sand
38	A	3.58	4.25	0.67	0.25	40% clean/brown sand, 60% brown sand
	B	5.17	6.25	1.08	0.33	50% clean/brown sand, 50% brown sand
	C	4.83	6.00	1.17	0.63	10% clean/brown sand, 90% brown sand
	D	4.50	5.25	0.75	0.46	20% clean/brown sand, 80% brown sand
	E	5.50	6.25	0.75	0.42	40% clean/brown sand, 60% brown sand
	F	6.83	7.67	0.83	0.42	50% liquified clean/brown sand, 50% solid
	G	8.00	8.50	0.50	0.42	5% clean/brown sand, 95% brown sand, very dry
	H	9.50	11.08	1.58	0.42	20% liquified clean sand, 80% clean/brown
39	A	3.08	3.08	0.00	0.00	Sand bottom of beach
	B	4.33	7.75	3.42	0.75	5% clean sand over 95% brown peaty sand
	C	5.00	7.67	2.67	0.79	10% brown sand, 90% brown peat, clay at bottom
	D	3.75	4.58	0.83	0.42	5% clean/brown sand, 95% brown sand
	E	3.75	5.00	1.25	0.50	All clean sand
	F	4.33	5.58	1.25	0.92	All very clean sand
	G	5.17	6.00	0.83	0.33	20% liquefied brown sand, 80% dry brown sand
	H	8.00	9.75	1.75	0.42	5% muck over 95% dry brown sand
	I	10.50	12.00 +	1.50 +		
40	A	4.00	5.08	1.08	0.54	5% clean sand, 95% brown sand
	B	4.83	7.67	2.83	0.75	All brown sand/peat
	C	5.00	7.50	2.50	0.63	All brown sand/peat
	D	5.50	7.67	2.17	0.42	All brown sand, less peat-like
	E	5.75	8.08	2.67	0.63	10% clean/brown sand, 90% brown sand
	F	6.00	9.33	3.33	0.75	10% clean/brown sand, 90% brown sand
	G	6.25	9.75	3.50	0.75	10% clean/brown sand, 90% peat
	H	6.58	10.25	3.67	0.58	40% clean/brown sand over 60% peat
	I	7.08	10.25	3.17	0.50	20% clean/brown sand, 80% peat
	J	10.00 +				
41	A	3.42	4.83	1.42	0.50	50% brown silt, 50% muck
	B	3.50	4.92	1.42	0.33	50% brown silt, 50% muck
	C	3.83	4.50	0.67	0.33	50% brown silt, 50% muck
	D	4.00	5.08	1.08	0.42	10% liquefied brown sand, 90% brown silt
	E	4.50	7.75	3.25	0.42	30% liquefied brown sand, 70% brown silt
	F	5.50	9.58	4.08	0.75	10% sand, 20% wet brown silt, 70% dry brown silt
	G	6.00	9.42	3.42	0.92	All peat, many roots
	H	6.50	10.17	3.33	0.58	All peat, many roots
	I	6.50	10.00	3.17	0.50	All peat, many roots
	J	6.83	12.00 +	5.17 +		

TRANSECT NUMBER	STATION LETTER	DEPTH TO TOP OF SILT	DEPTH TO BOTTOM	UNCOMPRESSED THICKNESS	COMPRESSED THICKNESS	SEDIMENT DESCRIPTION
42	A	3.42	3.42	0.00	0.00	Clean sand
	B	4.58	5.67	1.08	0.58	15% clean sand, 85% brown sand
	C	5.58	7.67	2.08	0.25	5% clean sand, 95% brown sand
	D	6.00	10.08	4.08	0.50	All brown silt
	E	6.08	9.58	3.50	0.46	95% brown silt, 5% liquefied sand
	F	6.58	10.17	3.42	0.50	90% brown silt, 10% liquefied sand
	G	7.17	12.00 +	4.67 +		
43	A	3.00	5.08	2.08	1.00	75% clean sand over 25% peat
	B	3.75	5.25	1.50	1.08	10% clean sand, 90% brown sand
	C	5.58	6.83	1.25	0.75	All peat
	D	6.08	8.50	2.42	0.83	5% muck, 95% peat
	E	6.25	10.25	4.00	0.75	All peat
	F	6.08	7.08	1.00	0.42	20% muck, 80% peat
	G	6.50	6.75	0.25	0.17	All clean sand
	H	10.25	12.00 +	2.75 +		
44	A	3.42	5.83	2.42	0.25	30% liquefied sand, 40% muck, 30 brown sand
	B	6.50	9.25	2.75	0.58	5% muck, 95% peat
	C	5.75	7.58	1.83	0.75	All peat

Table 2(a)

SEDIMENT VOLUME CALCULATIONS

Assumptions: Sediment to be removed to the original lake bottom 7 feet deep
OR: to the original lake bottom where the top of the sediment is 7 feet deep.
Calculation of cubic yards of sediment based on compressed thickness.
Conversion of Acre-Feet to Cubic Yards: 43,560 square feet x 1 foot deep
= 43,560 cubic feet / 27 cubic feet per cubic yard
= 1613.3 cubic yards per acre-foot.

EAST BASIN (NOT including area of new channel between basins)

Uncompressed Sediment Thickness	Acreage	Average Compressed Thickness	Acre-Feet of Sediment	X 1613.3 Cubic Yards per Acre-Foot	Cubic Yards of Sediment
0' - 1'	5.25	0.42 ft.	2.21	x 1613.3	3,565
1' - 2'	5.08	0.53 ft.	2.69	x 1613.3	4,340
2' - 3'	6.36	0.58 ft.	3.69	x 1613.3	5,953
3' - 4'	11.11	0.71 ft.	7.89	x 1613.3	12,729
4' - 5'	3.17	0.81 ft.	2.57	x 1613.3	4,146
5' - 6'	0.35	0.92 ft.	0.32	x 1613.3	516
				TOTAL CUBIC YARDS:	31,249

CENTRAL BASIN (NOT including area of new channel between basins)

Uncompressed Sediment Thickness	Acreage	Average Compressed Thickness	Acre-Feet of Sediment	X 1613.3 Cubic Yards per Acre-Foot	Cubic Yards of Sediment
0' - 1'	52.84	0.35 ft.	18.49	x 1613.3	29,830
1' - 2'	31.11	0.55 ft.	17.11	x 1613.3	27,604
2' - 3'	22.61	0.71 ft.	16.05	x 1613.3	25,893
3' - 4'	13.25	0.68 ft.	9.01	x 1613.3	14,536
4' - 5'	5.11	0.66 ft.	3.37	x 1613.3	5,437
5' +	0.36	0.66 ft.	0.24	x 1613.3	387
				TOTAL CUBIC YARDS:	103,687

WEST BASIN (NOT including area of new channel between basins)

Uncompressed Sediment Thickness	Acreage	Average Compressed Thickness	Acre-Feet of Sediment	X 1613.3 Cubic Yards per Acre-Foot	Cubic Yards of Sediment
0' - 1'	15.40	0.50 ft.	7.70	x 1613.3	12,422
1' - 2'	15.90	0.67 ft.	10.65	x 1613.3	17,182
2' - 3'	7.05	0.68 ft.	4.79	x 1613.3	7,728
3' - 4'	7.64	0.83 ft.	6.34	x 1613.3	10,228
4' +	0.40	0.92 ft.	0.37	x 1613.3	597
		TOTAL ACRE-FEET:	29.85	TOTAL CUBIC YARDS:	48,157

Table 2(b)

NEW CHANNEL CONSTRUCTION AND PROJECT TOTALS

Assumptions: In the channels connecting the East and Central basins and Central and West basins, sediment volumes are calculated for the removal of all sediment to the original lake bottom.

The Average Compressed Thickness is the average of the values of the two adjacent basins.

EAST CHANNEL, Connecting East and Central Basins

Uncompressed Sediment Thickness	Acreage	Average Compressed Thickness	Acre-Feet of Sediment	X 1613.3 Cubic Yards per Acre-Foot	Cubic Yards of Sediment
2' - 3'	1.50	0.65 ft.	0.98	x 1613.3	1,581
3' - 4'	1.90	0.70 ft.	1.33	x 1613.3	2,146
4' - 5'	1.33	0.74 ft.	0.98	x 1613.3	1,581
5' - 6'	1.15	0.79 ft.	0.91	x 1613.3	1,468
6' +	0.27	(est)0.83 ft.	0.22	x 1613.3	355
		ACRE-FEET	4.42	CUBIC YARDS:	7,131

WEST CHANNEL Connecting Central and West Basins

Uncompressed Sediment Thickness	Acreage	Average Compressed Thickness	Acre-Feet of Sediment	X 1613.3 Cubic Yards per Acre-Foot	Cubic Yards of Sediment
1' - 2'	0.85	0.61 ft.	0.52	x 1613.3	840
2' - 3'	2.55	0.70 ft.	1.79	x 1613.3	2,888
3' - 4'	0.25	0.76 ft.	0.19	x 1613.3	307
		ACRE-FEET	2.50	CUBIC YARDS:	4,035

Total ACRE-FEET and CUBIC YARDS of Sediment to the 7-foot depth

EAST BASIN	Acre-Feet	19.37	Cubic Yards	31,249
EAST-CENTRAL CHANNEL		4.42		7,131
CENTRAL BASIN		64.27		103,687
WEST-CENTRAL CHANNEL		2.50		4,035
WEST BASIN		29.85		48,157
	Acre-Feet	120.41	Cubic Yards	194,259

Table 3

POSSIBLE SEDIMENT DISPOSAL SITES

SITE #	COUNTY	LOCATION	ELEVATION	ESTIMATED COST	DESCRIPTION
1	Marshall	NW1/4,Sec.6	720-725	$400-500/acre	Some hydric soils, could store 3'-5', drains out of lake watershed. Reforestation could help the ground.
2	Marshall	N1/2,Sec.7	725-730	$400-500/acre	Some hydric soils, could store 2'-4', drains into the lake, access via drainage ditch.
3	Marshall	SE1/4,Sec.7	725	$650-700/acre	Some hydric soils, could store 2'-4', drains into the lake, access via drainage ditch.
4	Marshall	Sec.7,18	725+	$700 + /acre	Some hydric soils, could store 2'-4', but would require some levee work, drains into the the lake, access via drainage ditch. Crop fields, may be hard to buy.
5	Marshall	NW1/4,Sec.18	725+	$1,000/acre	Some hydric soils, drains into lake, easy access, easily diked, crop fields. Bill Spencer's property.
6	Starke	NE1/4,Sec.13	725 +	$1,000/acre	Some hydric soils, a little high but good volume. Easy to dike, but would have to cross 2 roads. Crop fields.
7	Starke	SE1/4,Sec.12	720-725	$1,000/acre	Some hydric soils. Very good spot, easy to levee, close, possibly 4' of storage. Crop fields.
8	Starke	SE1/4,Sec.12	720 +	$1,000/acre	No hydric soils. Close to lake, easy to dike. May have real estate value. Drainage into homesites may be a problem.
9	Starke	SE1/4,Sec.12	715 +	$1,000/acre	Some hydric soils, drains into Robbins Ditch. Good spot, close, could hold large volume. Crop field.
10	Starke	N1/2,Sec.13	720-725	$1,000/acre	Sandy soils, drains into Robbins Ditch. Easy to dike, but fairly high. Easy access via culvert under road. Crop field.
11	Starke	NW1/4,Sec.13	725+	$800-900/acre	Sandy soils, drains into Robbins Ditch. Pretty high, but good volume. Good farm land.

12	Starke	SW1/4,Sec.12	715-725	$800-900/acre	Mostly sandy soils, drains into Robbins Ditch, easy to dike. Crop fields.
13	Starke	SW1/4,Sec.2	700+	$750-800/acre	Sandy soils, possible ground water problem, easy to dike. Could have access via lake outlet. Large volume. Now farmed and pastured. Land may have several owners.
14	Starke	Sec.2,3	700-720	$1,000/acre	Mostly hydric soils, would drain into Robbins Ditch. Excellent elevation, but quite a distance from the lake.
15	Starke	SE1/4,Sec.2	720	$800-1,000/acre	Sandy soils. Could easily hold 4' of fill, easy to levee, easy access through marsh. Would drain southwest.
16	Starke	NE1/4,Sec.2	715-720	$600/acre	Sandy soil, could hold 3' to 4' of spoil, good elevation. Would have to cross highway.
17	Starke	NW1/4,Sec.1	725+	$500/acre	Sandy soils. Fairly hilly, would require more dozer work, could stair-step 3'. Easy to get to, but quite high.
18	Starke	NE1/4,Sec.1	725-730	$750/acre	Sandy soils, some pine trees. Would need to be terraced, but could hold 1' to 5' of fill. Would need to ascertain Nature Preserve boundaries.
19	Starke	NE1/4,Sec.1	725+	$700/acre	Sandy soils, small area. Easy access, could hold 1' to 4' of fill.
20	Starke	NW1/4,Sec.1	720	$500/acre	Sandy soils, easy access, gentle slopes, could hold 2' to 5'. Some stunted pine trees. Would need to ascertain Nature Preserve boundaries.

PTGR
ENGINEERS-LAND SURVEYORS

89-42
January 22, 1990

Jim New
612 Roosevelt
Walkerton, Indiana 46574

Re: Koontz Lake

Dear Jim:

Enclosed are three copies of the drawdown study for the above named lake. Please note that the study and estimated cost are based upon many assumptions. It is my understanding that you have discussed these with the Board, and they are familiar with them.

I have found no contractor who is willing to estimate the cost of excavation from the lake bottom after the lake has been drawndown. The stability of the lake bottom is critical if excavation is to take place with normal heavy equipment designed to be worked on dry land.

Should you have any questions on this matter, or wish to discuss this concept further, please contact me.

Sincerely,

PTGR, Inc.

Ordell L. Gertsmeier

OLG:dk
Enclosures

158 NAPOLEON VALPARAISO, IN 46383 219-462-1158 FAX 219-462-0329

ORDELL L. GERTSMEIER
Indiana Professional Engineer #9511
Indiana Land Surveyor #9970

RICHARD L. HUDSON
Indiana Land Surveyor #880018

DAVID L. PILZ
Indiana Professional Engineer #13688
Indiana Land Surveyor #12438

Table 4

89-42
01/22/90

KOONTZ LAKE DRAWDOWN STUDY

ESTIMATED INSTALLATION AND MAINTENANCE COST FOR SIPHON

Installation Cost

Alternate 1 - Using 1 - 12" Ø PVC Pipe and 1 - 24" Ø PVC Pipe

12" Diameter PVC	400 L.F. @ $ 30	= $12,000	
12" Fittings	6 Each @ $ 450	= 2,700	
12" Valve	1 Each @ $ 1,900	= 1,900	
24" Diameter PVC	400 L.F. @ $ 58	= 23,200	
24" Fittings	6 Each @ $ 1,025	= 6,150	
24" Valve	1 Each @ $14,300	= 14,300	
Vacuum Pumps	2 Each @ $ 1,000	= 2,000	
Inlet Sump	750 C.Y. @ $ 15	= 11,250	
Outlet Sump	150 C.Y. @ $ 15	= 2,250	
Engineering and Miscellaneous		= 15,150	
			$ 90,900

Alternate 2 - Using 2 - 18" Ø PVC Pipes

18" Diameter PVC	800 L.F. @ $ 46	= $36,800	
18" Fittings	12 Each @ $ 600	= 7,200	
18" Valves	2 Each @ $ 8,525	= 17,050	
Vacuum Pumps	2 Each @ $ 1,000	= 2,000	
Inlet Sump	750 C.Y. @ $ 15	= 11,250	
Outlet Sump	150 C.Y. @ $ 15	= 2,250	
Engineering and Miscellaneous		= 15,310	
			$ 91,860

Annual Maintenance Cost for Siphon

Daily Check of Siphon (2 hrs/day average)	365(2)($10)	= $ 7,300	
Periodic Maintenance Labor	200 hours @ $10	= 2,000	
Periodic Maintenance Equipment	L.S.	= 2,000	
Miscellaneous		= 1,000	
			$ 12,300

Dated this 22nd day of January, 1990

Prepared by:
PIGR, Inc.
Engineers-Land Surveyors
158 S. Napoleon Street
Valparaiso, Indiana 46383
219-462-1158

Table 5

KOONTZ LAKE - 346 ACRES

1989 Bass Population:	18,889	(3.8" to 22.5")
Bass per acre:	54.6	
Lbs. of Bass per acre:	21.7	

FISH STOCKED IN 1970 and 1971

SPECIES		# STOCKED	STATE'S COST IN 1988	TOTAL
Largemouth Bass	Adults	455	$26.00	$11,830.00
Largemouth Bass	Fingerlings	13,000	$0.65	$8,450.00
Bluegill	Fingerlings	4,600	$0.03	$138.00
Redear Sunfish	Fingerlings	3,200	$0.09	$288.00
Northern Pike	Fingerlings	3,500	$2.00	$7,000.00
Channel Catfish	Fingerlings	2,000	$0.84	$1,680.00
Black Crappie	Fingerlings	720	$0.25	$180.00
Walleye	Fry	500,000	$0.003	$1,500.00
			TOTAL COST	$31,066.00

COST OF RESTOCKING AFTER DRAWDOWN

SPECIES		# TO BE STOCKED	STATE'S COST IN 1988	TOTAL
Largemouth Bass	14" Adults	346	$10.00	$3,460.00
Largemouth Bass	Fingerlings	17,300	$0.65	$11,245.00
Bluegill	Fingerlings	34,600	$0.03	$1,038.00
Redear Sunfish	Fingerlings	34,600	$0.09	$3,114.00
Northern Pike	Fingerlings	3,460	$2.00	$6,920.00
Channel Catfish	Fingerlings	3,460	$0.84	$2,906.40
Black Crappie	Fingerlings	1,730	$0.25	$432.50
Walleye	Fry	500,000	$0.003	$1,500.00
			TOTAL COST	$30,615.90

APPENDIX 1

ORIGINAL PROJECT PROPOSAL

The Koontz Lake Environmental Enhancement Committee

Extends an

Invitation to Bid

the Following Work

All bids to be posted with

The Koontz Lake Environmental Enhancement Committee
c/o Lakeside Realty
R.R.#3, Koontz Lake
Walkerton, IN 46574

(219) 586-3106

SCOPE OF WORK

Koontz Lake Environmental Enhancement Committee is soliciting bids to determine which of two ways would be the most economical method to remove the sediment from Koontz Lake.

Method #1 would be by using the conventional dredging method.

Method #2 would be by lowering the lake level by siphoning or pumps so the sediment could be removed in a dry state.

We would like to complete this survey before the lake freezes over.

Please advise the Committee of your intent to bid. Bids must be received by 5:00 PM on November 14, 1989. Bids will be privately opened.

I. Determine the amount, type and location of sediments within the 0' to 10' contour of Koontz Lake

A. Construct a 1' contour map of sediment deposits as presently exist on the original bottom of Koontz Lake.

1. Core samples to be taken at each location shown on Map A

2. At each location, information shall be recorded as to:
   a. depth of the original bottom
   b. depth of sediments (as per techniques used by commercial dredges)
   c. general description of sediments, i.e. sand, silt, muck, etc.

B. Provide a volume estimate of sediments for each basin

1. Estimate cubic yardage of sediments as presently exist

2. Estimate cubic yardage of sediment if lake drawdown performed.

COST FOR PART I:_____

II. Provide information for sediment disposal

A. Determine disposal location(s)

B. Site(s) must be located on a USGS 7.5 minute topographic map and county plat book.

1. Site(s) acceptable to government agencies such as Indiana Department of Natural Resources, Indiana Department of Environmental Management, County Drainage Board(s), U.S. Army Corps of Engineers.

2. Site(s) must be of adequate size to handle estimated volume of sediment and accompanying water.

3. Site(s) must be within range of commercial dredges, generally 1 mile.

4. Show estimated location of levee on each site

C. Determine estimated cost of land and how obtained

D. Determine estimated cost of levee and how obtained

E. Determine estimated cost of rehabilitation of site after completion of project, including tiling and revegetation. Include name and address of firm to perform said work.

F. Obtain price quote for hydraulic dredging, including name and address of firm to perform said work.

COST FOR PART II:_____

III. Provide information for project if performed by conventional earth-moving equipment such as tracked or wheeled equipment.

A. Volume of water leaving lake by month.

B. Depth between individual basins.

C. Information for siphon drawdown.

1. Size of piping necessary and cost estimate.
   a. include pipe restrictions necessary to maintain drawdown.
   b. cost of installation and maintenance

2. Time required for drawdown

3. Time required for drying out and removing sediments

D. Permits necessary and estimate of time needed to obtain

E. Economic impact

1. Cost estimate compared to hydraulic dredging

2. Loss of recreational values for time period required

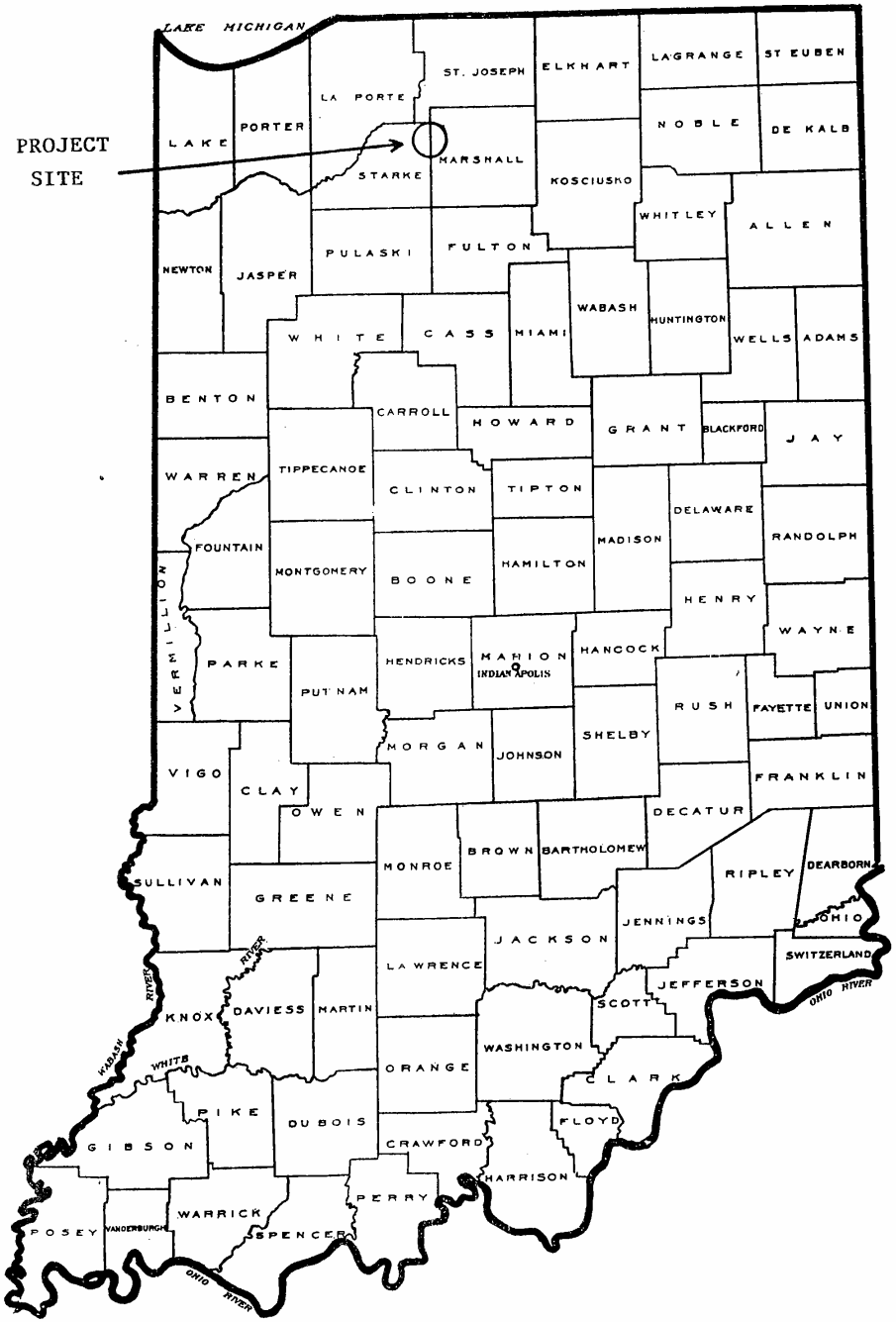
3. Loss of fish and restocking cost

4. Loss to local businesses
   a. local real estate values
   b. marina operators
   c. other businesses: restaurants, boat rentals, bed & breakfast

COST FOR PART III:_____

Provide a time schedule for completion of work. All work including write-up to be completed by:_____.
In the event a bid bond would be required, please include the additional cost here: $_____.

SITE #	# of Stations
1	2
2	4
3	13
4	10
5	8
6	3
7	4
8	5
9	3
10	6
11	7
12	4
13	4
14	8
15	6
16	9
17	6
18	7
19	7
20	6
21	3
22	2
23	2
24	4
25	3
26	5
27	6
28	6
29	3
30	6
31	4
32	2
33	3
34	1
35	4
36	2
37	6
38	9
39	9
40	11
41	11
42	9
43	8
44	3
TOTAL	244 Stations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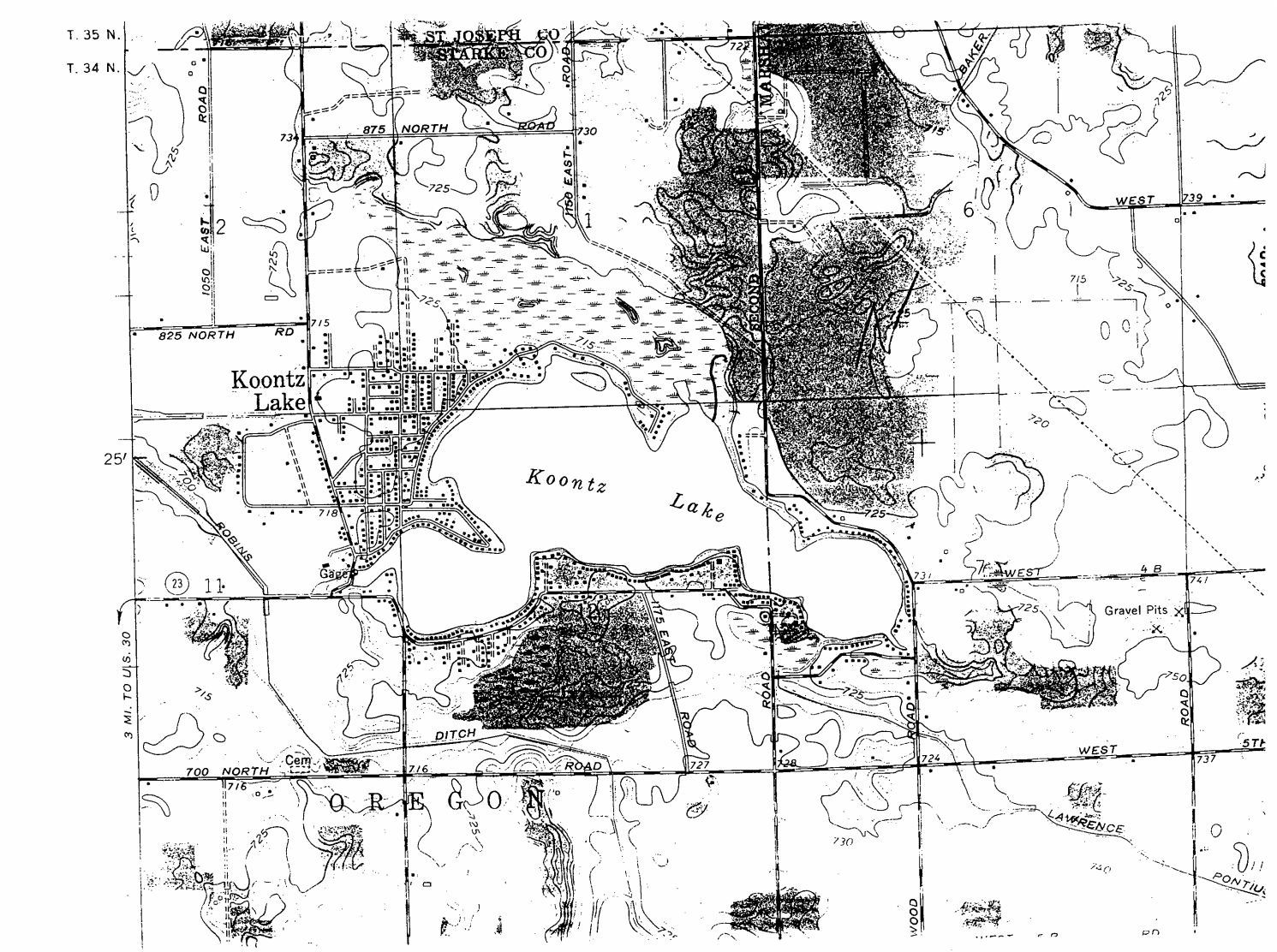
PROJECT SITE
LAKE
PORTER
LA PORTE
ST. JOSEPH
ELKHART
LAGRANGE
ST EUBEN
NOBLE
DE KALB
STARKE
MARSHALL
KOSCIUSKO
WHITLEY
ALLEN
NEWTON
JASPER
PULASKI
FULTON
WABASH
HUNTINGTON
WELLS
ADAMS
WHITE
CASS
MIAMI
BENTON
CARROLL
HOWARD
GRANT
BLACKFORD
JAY
WARREN
TIPPECANOE
CLINTON
TIPTON
DELAWARE
RANDOLPH
FOUNTAIN
MONTGOMERY
BOONE
HAMILTON
MADISON
HENRY
WAYNE
VERMILLION
PARKE
PUTNAM
HENDRICKS
MARION
INDIANAPOLIS
HANCOCK
RUSH
FAYETTE
UNION
VIGO
CLAY
OWEN
MORGAN
JOHNSON
SHELBY
FRANKLIN
DECATUR
SULLIVAN
GREENE
MONROE
BROWN
BARTHOLOMEW
RIPLEY
DEARBORN
OHIO
JENNINGS
JACKSON
SWITZERLAND
LAWRENCE
JEFFERSON
SCOTT
OHIO RIVER
KNOX
DAVIESS
MARTIN
WASHINGTON
WABASH RIVER
WHITE RIVER
ORANGE
CLARK
PIKE
DUBOIS
FLOYD
GIBSON
CRAWFORD
HARRISON
POSEY
VANDERBURGH
WARRICK
PERRY
SPENCER
OHIO RIVER


T. 35 N.
T. 34 N.
ST. JOSEPH CO
STARKE CO
ROAD
875 NORTH ROAD
1050 EAST
825 NORTH RD
Koontz Lake
Koontz Lake
ROBINS
Gage
3 MI. TO U.S. 30
DITCH
700 NORTH
Cem
ROAD
1175 EAST
ROAD
ROAD
ROAD
MARSH
SECOND
BAKER
WEST
WEST
WEST
Gravel Pits
LAWRENCE
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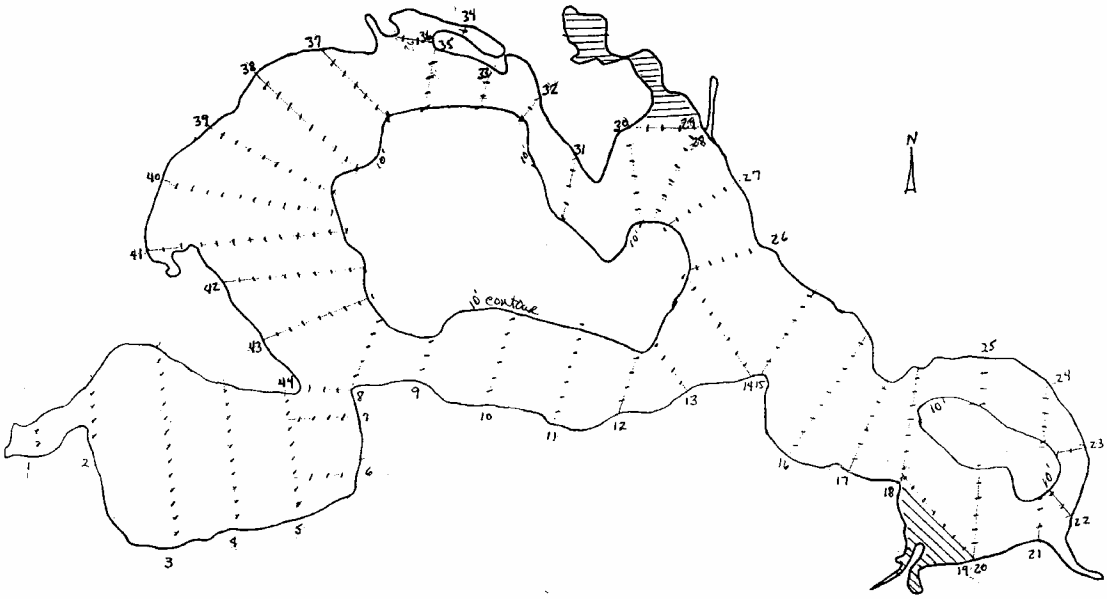

KOONTZ LAKE

0' to 10' contour

sample location map

APPENDIX 2

CORRESPONDENCE WITH REGULATORY AGENCIES

J.F. New & Associates

612 Roosevelt Road
P.O. Box 243
Walkerton, IN 46574

Environmental Permitting • Design
Mitigation • Construction

219-586-3400

December 15, 1989

U.S. Army Corps of Engineers
Attn: Gary Mannesto
Detroit District
P.O. Box 1027
Detroit, MI 48231-1027

Dear Mr. Mannesto:

The Koontz Lake Environmental Enhancement Committee is presently conducting a study to determine the amount of sedimentation that has occurred in Koontz Lake. The lake is located on the Marshall-Starke County line in north central Indiana. Extensive stabilization work has been done on the main inlet ditch and more work will be completed in 1990. The Committee feels it will soon have a very good idea of the magnitude of the sediment and nutrient problems.

The study will determine where sediments are located in the lake, what they are composed of and what methods, if any, may be employed to restore the lake bottom.

Two methods of sediment removal are being examined. These are: (1) hydraulic dredging and (2) lake drawdown with sediment removal by conventional earth moving equipment. The feasibility of these two methods is the purpose of this letter.

The Koontz Lake committee would like to know what permits, if any, the U.S. Army Corps of Engineers would require to:
(1) hydraulically remove an as-yet undetermined amount of uncontaminated sediment. Disposal sites are being examined that <u>will not</u> be in a floodway, regulated wetland, hydric soil or a forested area.
(2) draw the lake down approximately 12 feet using siphons and then mechanically remove accumulated sediments. Disposal sites will be the same as chosen for hydraulic removal of sediments.

Please note that this letter <u>is not</u> a request for permits. The Committee would like your agency's opinion of what steps and permits would be necessary should either one of the silt removal methods be chosen.

If you should have any questions, please feel free to contact me. Thank you for your cooperation.

Sincerely,

Jimmy F. New

DEPARTMENT OF THE ARMY
DETROIT DISTRICT, CORPS OF ENGINEERS
BOX 1027
DETROIT, MICHIGAN 48231-1027

April 5, 1990

IN REPLY REFER TO
Construction-Operations Division
Regulatory Functions Branch 90-150-1-9001

Mr. Jim New
New and Associates
612 Roosevelt Road
P. O. Box 243
Walkerton, Indiana 46574

Dear Mr. New:

Please refer to your February 27, 1990 letter to this office concerning the Koontz Lake Environmental Enhancement Committee's plans to remove sediments from Koontz Lake (Marshall and Starke Counties, Indiana).

This letter has been sent to officially inform you that under Section 404 of the Clean Water Act, a Corps of Engineers Permit is required for any discharge of dredged and/or fill material into waters of the United States including wetlands. To better explain the Corp's permit program, an application and informational brochures have been enclosed.

Removal method 1, performed as stated in your letter, is an activity not regulated by the Corps. However, depending on the methodology, the dewatering of spoils and/or the discharge of return water may constitute a fill disharge. Removal method 2, if conducted without a discharge of dredged material, is also outside the Corps' jurisdiction. Moving lake sediments with a bulldozer, temporarily sidecasting material on the lake bottom, and constructing access roads into the lake are examples of fill disharges that require prior Corps authorization.

If you anticipate any discharge of dredged or fill material into Koontz Lake or its adjacent wetlands, please complete and return the enclosed application. Should you have any questions, please contact Donald Reinke at the above address or telephone (313) 226-2220.

Sincerely,

Gary R. Mannesto
Chief, Regulatory Functions Branch
Construction-Operations Division

Enclosures

J.F. New & Associates

612 Roosevelt Road
P.O. Box 243
Walkerton, IN 46574

Environmental Permitting • Design
Mitigation • Construction

219-586-3400

December 15, 1989

U.S. Environmetal Protection Agency
Attn: Tom Glatzel
Aquatic Resources Unit 5WQA-TUB8
230 South Dearborn Street
Chicago, Illinois 60604

Dear Tom,

The Koontz Lake Environmental Enhancement Committee is presently conducting a study to determine the amount of sedimentation that has occurred in Koontz Lake. The lake is located on the Marshall-Starke County line in north central Indiana. Extensive stabilization work has been done on the main inlet ditch and more work will be completed in 1990. The Committee feels it will soon have a very good idea of the magnitude of the sediment and nutrient problems.

The study will determine where sediments are located in the lake, what they are composed of and what methods, if any, may be employed to restore the lake bottom.

Two methods of sediment removal are being examined. These are: (1) hydraulic dredging and (2) lake drawdown with sediment removal by conventional earth moving equipment. The feasibility of these two methods is the purpose of this letter.

The Koontz Lake committee would like to know what permits, if any, the U.S. Environmental Protection Agency would require to:
(1) hydraulically remove an as-yet undetermined amount of uncontaminated sediment. Disposal sites are being examined that <u>will not</u> be in a floodway, regulated wetland, hydric soil or a forested area.
(2) draw the lake down approximately 12 feet using siphons and then mechanically remove accumulated sediments. Disposal sites will be the same as chosen for hydraulic removal of sediments.

Please note that this letter <u>is not</u> a request for permits. The Committee would like your agency's opinion of what steps and permits would be necessary should either one of the silt removal methods be chosen.

If you should have any questions, please feel free to contact me. Thank you for your cooperation.

Sincerely,

Jimmy F. New

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF:

5WQS-TUB-8

APR 12 1990

Mr. Jim New
612 Rooevelt Road
P.O. Box 243
Walkerton, IN 46524

Dear Mr. New:

Thank you for your December 1, 1989, letter to Tom Glatzel regarding permits required for the Koontz Lake dredging and inlet stabilization project.

Your project wil require a Section 401 certification or a National Pollutant Discharge Elimination System (NPDES) Permit from the Indiana Department of Environmental Management (IDEM) for any discharge of return water from the dredge spoils site, for either hydraulicly or mechanically removed sediments. (Mechanically removed sediments, if allowed to dry out for a period of time after lake draw down and before mechanical dredging, are likely to contain less water and therefore produce a smaller volume of return water. However, a 401 certification or a NPDES permit will likely be required regardless of the technique used, if there is any discharge of return water to any surface water body, including wetlands.) For more information regarding 401 certification/NPDES permits, contact:

Mr. Charles Bardonner
Assistant Commissioner for Water
Indiana Department of Environmental Management
P.O. Box 6015
105 South Meridian Street
Indianapolis, Indiana 46015-6015

Your project will require a Section 404 permit from the U.S. Army Corps of Engineers should you place dredge spoils in a wetland. Your letter refers to unregulated wetlands. For the purposes of Section 404, all wetlands are regulated, and placement of fill of any kind in wetlands requires a Section 404 permit. For assistance with a Section 404 permit, contact the appropriate office of the U.S. Army Corps of Engineers.

Your project may also require additional permits from the State of Indiana for such aspects of your project as the disturbance of the lake bottom and the inlet stabilization work. For more information, please contact Mr.

Bardonner of the IDEM at the above address, and the staff of the Lake Enhancement Program at the Indiana Department of Natural Resources. Their address is:

Lake Enhancement Program
Division of Soil Conservation
IDNR FLXI
Purdue University
West Lafayette, Indiana 47907

Enclosed for your information is an excerpt from the U.S. EPA regulations for lake restoration projects that describes the testing needed for a dredging project funded with U.S. EPA Clean Lakes funds.

Also enclosed for your information is a copy of the complete testing methodology used in an approved U.S. EPA Clean Lakes project (Skokie Lagoons, Illinois).

Sincerely yours,

Donald J Roberts

Donald Roberts
Lakes Program

Enclosure

J.F. New & Associates

612 Roosevelt Road
P.O. Box 243
Walkerton, IN 46574

Environmental Permitting • Design
Mitigation • Construction

219-586-3400

December 20, 1989

Indiana Department of Environmental Management
Attn: Marty Maupin
Chesapeake Building
105 South Meridian Street
Indianapolis, IN 46225

Dear Marty,

The Koontz Lake Environmental Enhancement Committee is presently conducting a study to determine the amount of sedimentation that has occurred in Koontz Lake. The lake is located on the Marshall-Starke County line in north central Indiana. Extensive stabilization work has been done on the main inlet ditch and more work will be completed in 1990. The Committee feels it will soon have a very good idea of the magnitude of the sediment and nutrient problems.

The study will determine where sediments are located in the lake, what they are composed of and what methods, if any, may be employed to restore the lake bottom.

Two methods of sediment removal are being examined. These are: (1) hydraulic dredging and (2) lake drawdown with sediment removal by conventional earth moving equipment. The feasibility of these two methods is the purpose of this letter.

The Koontz Lake committee would like to know what permits, if any, the Department of Environmental Management would require to:
(1) hydraulically remove an as-yet undetermined amount of uncontaminated sediment. Disposal sites are being examined that <u>will not</u> be in a floodway, regulated wetland, hydric soil or a forested area.
(2) draw the lake down approximately 12 feet using siphons and then mechanically remove accumulated sediments. Disposal sites will be the same as chosen for hydraulic removal of sediments.

Please note that this letter <u>is not</u> a request for permits. The Committee would like your agency's opinion of what steps and permits would be necessary should either one of the silt removal methods be chosen.

If you should have any questions, please feel free to contact me. Thank you for your cooperation.

Sincerely,

Jimmy F. New

Jimmy F. New

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

105 South Meridian Street
P.O. Box 6015
Indianapolis 46206-6015
Telephone 317/232-8603

February 5, 1990

Mr. Jim New, President
J. F. New & Associates
612 Roosevelt Road
P.O. Box 243
Walkerton, Indiana 46574

Re: Sediment Removal on Koontz Lake
Marshall-Starke County Line

Dear Mr. New:

Please reference your letter of December 20, 1989, regarding sediment removal on Koontz Lake. If dredged material is placed in a wetland or other waters of the United States it is possible that a permit under the authority of Section 404 of the Clean Water Act would be required. We recommend you contact the Detroit District, U.S. Army Corps of Engineers regarding this permit. If the U.S. Army Corps of Engineers requires you to apply for an individual Section 404 permit you will have to obtain Section 401 Water Quality Certification from this agency before the U.S. Army Corps of Engineers can process the permit. There is also a possibility that a National Pollution Discharge Elimination System (NPDES) permit would be required for the discharge of the returned water from the dredging operation. Once the method of dredging is decided, please contact Lonnie Brumfield of our Permits Section (317/232-8705), concerning the need for the NPDES permit.

Regarding the two methods of sediment removal, it is the judgment of this office that drawing down of Koontz Lake could adversely impact adjacent wetlands dependent upon the present lake level. Therefore, we recommend hydraulic removal. We must inform you that it is possible that U.S. Army Corps of Engineers might require you to obtain an individual Section 404 permit for the soil particles contained in the return water from the hydraulic dredging.

If you have any further questions, contact Mr. Marty Maupin at 317/243-5035.

Sincerely,

Charles B. Bardonner
Assistant Commissioner
Office of Water Management

MM/bo

J.F. New & Associates

612 Roosevelt Road
P.O. Box 243
Walkerton, IN 46574

Environmental Permitting • Design
Mitigation • Construction

219-586-3400

February 14, 1990

Lonnie Brumfield
Permits Section
Indiana Dept. of Environmental Management
105 South Meridian Street
P.O. Box 6015
Indianapolis, IN 46206-6015

Dear Mr. Brumfield,

Our consulting firm is presently assisting the Koontz Lake Environmental Enhancement Committee by compiling data for the possible dredging of Koontz Lake. The lake has suffered considerable sedimentation in the past century.

In response to our request to the IDEM for information about permits required for dredging and sediment disposal, Mr. Charles Boardman, Assistant Commissioner in the Office of Water Management, suggested there might be a need for a National Pollution Discharge Elimination System (NPDES) permit.

Our findings to date suggest hydraulic dredging will be used to remove sediment from the lake bottom. The Koontz Lake Environmental Enhancement Committee has been made aware of the need for the Section 404 permit and has been shown several possible disposal sites that will not affect regulated or jurisdictional wetlands, significant vegetation areas or other environmentally sensitive sites.

We do know that filtering of discharge water from the desilting ponds will be necessary. We would appreciate <u>any</u> additional information as to methods and permits we will be expected to incorporate into our final plans.

Would you please feel free to make suggestions and inform us of all permits and procedures necessary. We are looking forward to designing an environmentally sound lake rehabilitation program.

Respectfully,

Jimmy F. New

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

105 South Meridian Street
P.O. Box 6015
Indianapolis 46206-6015
Telephone 317-232-8603

May 3, 1990

Mr. Jimmy F. New
J. F. New & Associates
612 Roosevelt Road
P.O. Box 243
Walkerton, Indiana 46574

Re: Koontz Lake Environmental Enhancement

Dear Mr. New:

We have reviewed your letter of February 14, 1990, and offer the following responses. This office issues two separate types of permit. National Pollutant Discharge Elimination System (NPDES) permits are issued, pursuant to the Clean Water Act (33 U.S.C. 1251, et. seq.), the Indiana Environmental Management Act (specifically IC 13-7) and federal and state regulations promulgated thereunder (40 CFR 400 series and 327 IAC 5, Rules 1-10) for the discharge of wastewater containing pollutants. Construction permits are issued prior to the construction of any wastewater treatment facility, including sewers, pursuant to 327 IAC Article 3.

As explained in the letter to you of February 5, 1990, from Mr. Bardonner, if a project involves wetlands and the Corps of Engineers requires a Section 404 (CWA) dredge and fill permit, then a Section 401 Water Quality Certification is required from this agency.

According to 327 IAC 5-2-4(a)(2), routine discharges of dredge and fill material into waters of the state which are regulated under Section 404 do not require an NPDES permit. This also includes the discharge of decant water from a basin where dredged material has been placed, back to waters of the state. An NPDES permit would be required however if the dredged material were contaminated by toxic pollutants which could exceed water quality values.

We appreciate your inquiry, as this should help you to avoid certain problems which may be encountered otherwise. If you have any further questions regarding NPDES issues, please call Mr. Mark Stanifer of my staff at 317/232-8704. Questions regarding construction permits should be directed to Mr. Rick Milton of the Facilities Construction Section at 317/232-8645. Questions concerning Section 401 Water Quality Certification should be directed to Mr. Marty Maupin at 317/243-5035.

Sincerely,

Lonnie Brumfield

Lonnie Brumfield, Chief
Permits Section
Office of Water Management

MWS/jkb

cc: Starke County Health Department

J.F. New & Associates

612 Roosevelt Road
P.O. Box 243
Walkerton, IN 46574

Environmental Permitting • Design
Mitigation • Construction

219-586-3400

December 20, 1989

IDNR, Division of Nature Preserves
Attn: John Bacone
601 State Office Building
Indianapolis, IN 46204

Dear John,

The Koontz Lake Environmental Enhancement Committee is presently conducting a study to determine the amount of sedimentation that has occurred in Koontz Lake. The lake is located on the Marshall-Starke County line in north central Indiana. Extensive stabilization work has been done on the main inlet ditch and more work will be completed in 1990. The Committee feels it will soon have a very good idea of the magnitude of the sediment and nutrient problems.

The study will determine where sediments are located in the lake, what they are composed of and what methods, if any, may be employed to restore the lake bottom.

Two methods of sediment removal are being examined. These are: (1) hydraulic dredging and (2) lake drawdown with sediment removal by conventional earth moving equipment. The feasibility of these two methods is the purpose of this letter.

The Koontz Lake committee would like to know what permits, if any, the Division of Nature Preserves would require to:

(1) hydraulically remove an as-yet undetermined amount of uncontaminated sediment. Disposal sites are being examined that <u>will not</u> be in a floodway, regulated wetland, hydric soil or a forested area.

(2) draw the lake down approximately 12 feet using siphons and then mechanically remove accumulated sediments. Disposal sites will be the same as chosen for hydraulic removal of sediments.

Please note that this letter <u>is not</u> a request for permits. The Committee would like your agency's opinion of what steps and permits would be necessary should either one of the silt removal methods be chosen.

If you should have any questions, please feel free to contact me. Thank you for your cooperation.

Sincerely,

Jimmy F. New

INDIANA DEPARTMENT OF NATURAL RESOURCES

PATRICK R. RALSTON, DIRECTOR

Division of Nature Preserves
605B State Office Building
Indianapolis, Indiana 46204-2267
317-232-4052

January 11, 1990

Jim New, President
J.F. New & Associates
612 Roosevelt Road
P.O. Box 243
Walkerton, IN 46574

Dear Jim:

This is in response to your letter of December 20, 1989 related to proposals to dredge sediments from Koontz Lake in Starke County, Indiana. Large areas of wetlands on the north side of Koontz Lake are owned by the Division of Nature Preserves and are officially dedicated as a nature preserve. Indiana's Nature Preserve Law, I.C. -14-4-5, establishes a permanent restrictive easement on tracts of land which have been dedicated. The intent of the law is that an area so designated will remain forever as a nature preserve and that no man-made changes which will destroy or degrade the natural quality of the site will be allowed. There is no permitting process which relates to potential impacts to nature preserves. However, we are given the opportunity to comment on projects which might have detrimental impacts to dedicated areas.

We are not certain if hydraulic removal of sediments will result in any direct impacts to wetlands in the nature preserve. If the lake is not drawn down during the operation, the impact should be minimal. However, drawing down the lake approximately 12 feet is likely to result in serious detrimental impacts to the quality of the wetland communities present.

Much of the wetland natural community present there contains boreal relict vegetation. These are plants which are out of their normal range, which is far to the north of Koontz Lake. As species which are far out of their range, they require very exacting growing conditions for survival. Any sudden changes in their requirements (such as a severe drop in water level) are likely to stress them beyond any capability to survive here. In addition, the wetland areas exposed to long exposure of mucky

soils above the normal water line will be particularly vulnerable to invasion by aggressive native and alien species, particularly cattails and purple loosestrife, as well as others. These species will severely impact the quality of the wetlands and reduce the species diversity.

Actions required by the dredging proposals will require a permit from DNR's Division of Water, and our office will have the opportunity to comment on the proposed plans. Be assured that we will recommend denial of the proposal to lower the water level of the lake. Hydraulic dredging would be our preferred option, although we would like more information before making a recommendation.

If you have any questions regarding my comments, please let me know. Thanks for the opportunity to provide input into this project.

Sincerely,

John A. Bacone, Director
Division of Nature Preserves

JAB/LAC/mwd

J.F. New & Associates

612 Roosevelt Road
P.O. Box 243
Walkerton, IN 46574

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219-586-3400

December 15, 1989

IDNR, Division of Fish and Wildlife
Planning, Environment & Nongame Section
Attn: David Turner
607 State Office Building
Indianapolis, IN 46204

Dear David,

The Koontz Lake Environmental Enhancement Committee is presently conducting a study to determine the amount of sedimentation that has occurred in Koontz Lake. The lake is located on the Marshall-Starke County line in north central Indiana. Extensive stabilization work has been done on the main inlet ditch and more work will be completed in 1990. The Committee feels it will soon have a very good idea of the magnitude of the sediment and nutrient problems.

The study will determine where sediments are located in the lake, what they are composed of and what methods, if any, may be employed to restore the lake bottom.

Two methods of sediment removal are being examined. These are: (1) hydraulic dredging and (2) lake drawdown with sediment removal by conventional earth moving equipment. The feasibility of these two methods is the purpose of this letter.

The Koontz Lake committee would like to know what permits, if any, the Division of Fish & Wildlife would require to:
(1) hydraulically remove an as-yet undetermined amount of uncontaminated sediment. Disposal sites are being examined that <u>will not</u> be in a floodway, regulated wetland, hydric soil or a forested area.
(2) draw the lake down approximately 12 feet using siphons and then mechanically remove accumulated sediments. Disposal sites will be the same as chosen for hydraulic removal of sediments.

Please note that this letter <u>is not</u> a request for permits. The Committee would like your agency's opinion of what steps and permits would be necessary should either one of the silt removal methods be chosen.

If you should have any questions, please feel free to contact me. Thank you for your cooperation.

Sincerely,

Jimmy F. New

INDIANA DEPARTMENT OF NATURAL RESOURCES

PATRICK R. RALSTON, DIRECTOR

January 6, 1990

Mr. Jim New, President
J.F. New and Associates
612 Roosevelt Road
P.O. Box 243
Walkerton, IN 46574

Dear Mr. New:

Your inquiry regarding sediment removal from Koontz Lake raises some questions for which answers will be necessary before a permit can be issued.

(1) Who has determined that sediments are uncontaminated, and what data is available to substantiate this finding?
(2) At what time of year is a lake draw down being considered?
(3) Where is the proposed sediment removal to occur, and how will the "original" bottom elevation be determined?

A DNR permit will be required to lower the level of Koontz Lake and to alter the bed of the lake. Such permits are administered by the Division of Water. I direct your attention to I.C. 13-2-11.1-6, Acts 1982, P.L. 103 regarding changing lake level, dredging or mining.

Application for lake alteration permits should be submitted to:

Division of Water
2475 Director's Row
Indianapolis, IN 46241

Sincerely,

David Turner

David Turner
Environmental Unit

J.F. New &
Associates

612 Roosevelt Road
P.O. Box 243
Walkerton, IN 46574

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219-586-3400

December 20, 1989

Larry Fisher
Marshall County Surveyor
112 West Jefferson
Plymouth, IN 46563

Dear Larry,

The Koontz Lake Environmental Enhancement Committee is presently conducting a study to determine the amount of sedimentation that has occurred in Koontz Lake. The lake is located on the Marshall-Starke County line in north central Indiana. Extensive stabilization work has been done on the main inlet ditch and more work will be completed in 1990. The Committee feels it will soon have a very good idea of the magnitude of the sediment and nutrient problems.

The study will determine where sediments are located in the lake, what they are composed of and what methods, if any, may be employed to restore the lake bottom.

Two methods of sediment removal are being examined. These are: (1) hydraulic dredging and (2) lake drawdown with sediment removal by conventional earth moving equipment. The feasibility of these two methods is the purpose of this letter.

The Koontz Lake committee would like to know what permits, if any, the Marshall County Surveyor's Office would require to:
(1) hydraulically remove an as-yet undetermined amount of uncontaminated sediment. Disposal sites are being examined that <u>will not</u> be in a floodway, regulated wetland, hydric soil or a forested area.
(2) draw the lake down approximately 12 feet using siphons and then mechanically remove accumulated sediments. Disposal sites will be the same as chosen for hydraulic removal of sediments.

Please note that this letter <u>is not</u> a request for permits. The Committee would like your agency's opinion of what steps and permits would be necessary should either one of the silt removal methods be chosen.

If you should have any questions, please feel free to contact me. Thank you for your cooperation.

Sincerely,

Jimmy F. New

SURVEYOR'S OFFICE MARSHALL COUNTY
COUNTY BUILDING. 112 W. JEFFERSON STREET
PLYMOUTH. INDIANA 46563
OFFICE PHONE 219-935-8530

LARRY C. FISHER
REGISTERED LAND SURVEYOR
INDIANA REG. NO. S0533

December 21, 1989

Mr. Jim New
J.F. New & Associates
612 Roosevelt Road
P.O. Box 243
Walkerton, Indiana 46574

Dear Jim;

In regards to your letter of December 20, 1989, the Drainage Board would not require any permits for sediment removal in Koontz Lake.

From a personal standpoint, I hope your committee is successful in your efforts.

Sincerely,

Larry C. Fisher, L.S.
Surveyor, Marshall County

LCF/brn

J.F. New & Associates

612 Roosevelt Road
P.O. Box 243
Walkerton, IN 46574

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219-586-3400

December 21, 1989

Jody Melton
Kankakee River Basin Commission
8149 Kennedy Avenue
Highland, IN 46322

Dear Jody,

The Koontz Lake Environmental Enhancement Committee is presently conducting a study to determine the amount of sedimentation that has occurred in Koontz Lake. The lake is located on the Marshall-Starke County line in north central Indiana. Extensive stabilization work has been done on the main inlet ditch and more work will be completed in 1990. The Committee feels it will soon have a very good idea of the magnitude of the sediment and nutrient problems.

The study will determine where sediments are located in the lake, what they are composed of and what methods, if any, may be employed to restore the lake bottom.

Two methods of sediment removal are being examined. These are: (1) hydraulic dredging and (2) lake drawdown with sediment removal by conventional earth moving equipment. The feasibility of these two methods is the purpose of this letter.

The Koontz Lake committee would like to know what permits, if any, the Kankakee River Basin Commission would require to:
(1) hydraulically remove an as-yet undetermined amount of uncontaminated sediment. Disposal sites are being examined that <u>will not</u> be in a floodway, regulated wetland, hydric soil or a forested area.
(2) draw the lake down approximately 12 feet using siphons and then mechanically remove accumulated sediments. Disposal sites will be the same as chosen for hydraulic removal of sediments.

Please note that this letter <u>is not</u> a request for permits. The Committee would like your agency's opinion of what steps and permits would be necessary should either one of the silt removal methods be chosen.

If you should have any questions, please feel free to contact me. Thank you for your cooperation.

Sincerely,

Jimmy F. New

Kankakee River Basin Commission
8149 Kennedy Ave. Highland, Indiana 46322 (219) 923-1118

January 5, 1990

Jim New, President
J.F New and Associates
612 Roosevelt Road. P. O. Box 243
Walkerton, Indiana 46574

Dear Jim:

The Kankakee River Basin Commission does not have any permitting authority. We do consult with local drainage boards and the Indiana Department of Natural Resources on matters affecting the Kankakee River and make comments on permit requests if warranted.

The sediment removal suggested by the Koontz Lake Environmental Enhancement Committee would most likely need to be approved by the respective county drainage boards and by IDNR. If any wetlands are involved or affected, the Detroit office of the U.S. Army Corps of Engineers should also be contacted.

Good luck in this endeavor.

Sincerely,

Larry Fisher
Chairman

APPENDIX 3

CONVENTIONAL DREDGING CONTRACTORS

Appendix 3

LIST OF CONTRACTORS FOR KOONTZ LAKE PROJECT

William Woodruff
LaPorte County Landscaping
7657 West State Road 2
LaPorte, IN 46350
(219) 785-4303

Ron Bellinger
Hardy Lake Excavating
503 Virginia Street
Walkerton, IN 46574
(219) 586-2234

Wolff Construction
County Road 150 West
Union Mills, IN 46382
(219) 767-2295

Ron Reinholt
Reinholt Excavating
Box 86
Leiters Ford, IN 46945
(219) 542-4616

Jim Drake
Jim Drake Excavating
65480 Smilax Road
North Liberty, IN 46554
(219) 656-3527 (before 12:30)
(219) 656-3664 (leave message w/Paula)

Paul DeSabitine
R.R.#1
Winamac IN 46996
(219) 946-4260

Koontz and King
18201 Apple Road
Bourbon, IN 46504
(219) 342-4452 (shop)
(219) 353-7889 (home)

Don Stubbs
Stubbs Trucking
West 17th Road
Culver, IN 46511
(219) 842-3176

George E. Hopple
Hopple Trucking & Excavating
17036 Tamarack Road
Culver, IN 46511
(219) 842-2514